Nationwide Permit Pre-Construction Notification
Nationwide Permit 3 – Maintenance and 14 – Linear Transportation Projects
Prepared and Submitted in Accordance with
Section 404 of the Clean Water Act, 33 U.S. Code § 1344

Kaipapaʻu Stream Bridge Replacement

Hauʻula, Koʻolauloa District, Island of Oʻahu, Hawaiʻi

Federal Aid Project No. BR-083-1(48)

Tax Map Keys: (Portions) (1) 5-004-011: 004, 020, 021, 022 and (1) 5-004-018: 001, 002, 003, 016

December 2018

Prepared For:

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Project No. 21655-00P

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Honolulu District U. S. Army Corps of Engineers Nationwide Permit Pre-Construction Notification (PCN) Template

Honolulu District
U.S. Army Corps of Engineers

Nationwide Permit Pre-Construction Notification (PCN)

This PCN template integrates requirements of the U.S. Army Corps of Engineers (Corps) Nationwide Permit (NWP) Program with the Honolulu District (POH) NWP Regional Conditions. Boxes 1-10 should be completed to include all information required by NWP General Condition 32. Boxes 11 and 12 (or other sufficient information to show compliance with all NWP General and POH Regional Conditions) is also recommended to be completed for proposed activities seeking verification under the NWP Program. If additional space is needed, please provide as a separate attachment. Please refer to the attached *Instructions for the Honolulu District Nationwide Permit Pre-Construction Notification (PCN)* (Instructions) for instructions on completing the PCN.

To be completed by the Corps – do not fill-in

Application Number:	**Date Received:**	**Date Complete:**
POH-2005-00342		

1. Prospective Permittee and Agent Contact Information (see Instructions)

a. Prospective Permittee

First - Jade Middle - T Last - Butay

Company - State of Hawaii Dept. of Transportation Email Address - Jade.Butay@hawaii.gov

Address - 869 Punchbowl Street City - Honolulu State/Territory - HI Zip - 96813-5097

Phone (Residence/Mobile) - ______ Phone (Business) - (808) 587-2150

b. Agent (if applicable)

First - Brian Middle - ______ Last - Takeda

Company - R. M. Towill Corporation Email Address - BrianT@rmtowill.com

Address - 2024 North King Street, Suite 200 City - Honolulu State/Territory - HI Zip - 96819

Phone (Residence/Mobile) - ______ Phone (Business) - (808) 842-1133

c. Statement of Authorization: I hereby authorize Brian Takeda, R. M. Towill Corporation, to act on my behalf as my agent for the proposed activity. (Optional, see instructions)

______ Signature of Applicant ______ Date

2. Name and Location of the Proposed Activity (see Instructions)

☐ The proposed work would involve multiple-single and complete projects. See attachment for the information required in Boxes 2 through 12, as applicable.

a. Project Name or Title:	**b. City, County, Island, State/Territory:**
Kaipapaʻu Stream Bridge Replacement Project	Hauʻula, Koʻolauloa District, Island of Oʻahu, Hawaiʻi

c. Name of Impacted Waterbody(ies):

Kaipapaʻu Stream

d. Coordinates (in decimal format):

Latitude - N 21°37'02" Longitude - W 157°54'50"

☐ Unknown (please provide other location descriptions below)

e. Other Location Description (optional, see instructions):

f. Directions to the site (optional, see instructions):

The project is located along Kamehameha Highway (State Route 83) near Milepost 21 in the Hauʻula, Island of Oʻahu, Hawaiʻi. Kaipapaʻu Stream Bridge is located approximately 0.3 miles north of Hauʻula Beach Park. The bridge crosses Kaipapaʻu Stream approximately 300 feet upstream from coastal marine waters.

3. Specific NWP(s) you want to use to authorize the proposed activity (see Instructions)

Nationwide Permit (NWP) #3 (Maintenance Activities) and NWP #14 (Linear Transportation Projects)

4. Description of the Proposed Activity (see Instructions)

a. Complete description of the Proposed Activity:

See Supplemental Information 4a.

Impact Quantifications:

For discharges of dredged/fill material (*if more than 3 fill activities proposed, include extended table as an attachment*):

☐ N/A, no discharge of dredged or fill material in waters of the U.S. proposed.

Impacted Water Name (e.g. Aloha Stream)	**Impacted Water Type** (T-Tributary, W-Wetland, N-Navigable water)	**Fill Activity** (e.g. sandbag berm, temp access, bank stabilization, etc.)	**Fill Dimensions in Waters of the U.S.** *Note: Only record fill placed below Ordinary High Water Mark (OHWM) for Stream/Tributary, Wetland Boundary or High Tide Line (HTL) for Navigable Waters*				**Impact Duration** (T-Temporary, P-Permanent, L-Loss)	**Fill Material Type** (e.g. boulder, sand, sandbag, soil, etc.)
			Length (ft)	**Width (ft)**	**Area (sq ft)**	**Volume (cy)**		
Kaipapaʻu Stream	■T ☐W ■N	Sandbag BMPs	1,210	1 ft per sandbag	8,470	25 CY in MHHW and 5 CY in OHWM	■T ☐P ☐L	sandbags
	☐T ☐W ☐N						☐T ☐P ☐L	
	☐T ☐W ☐N						☐T ☐P ☐L	

For structures (*if more than 3 structures proposed, include extended table as an attachment*):

☐ N/A, no structures in navigable waters proposed.

Impacted Navigable Water Name (e.g. Mahalo Bay)	**Impacted Water Type** (T/W/N)	**Type of Structure and Material** (e.g. HDPE pipeline, concrete pier, steel cofferdam, etc.)	**Structure's Position** (I-In/O-Over/ U-Under nav water)	**Structure's Dimensions in Navigable Waters**			**Impact Duration** (T-Temporary, P-Permanent, L-Loss)
				Length (ft)	**Width (ft)**	**Area (sq ft)**	
Kaipapa'u Stream	☐T ☐W ■N	Concrete Detour Bridge / Concrete Bridge Pier / Rip-rap and filter rock	■I ■O ☐U	90 / 45 / 54	42 / 3 / 15	3,780 / 135 / 810	■T ☐P ☐L
Kaipapa'u Stream	☐T ☐W ■N	Waterlines: Temp 12" / Temp 16" / Perm 16"	☐I ■O ■U	125 / 250 / 155	2 / 16 / 16	125 / 333 / 207	■T ■P ☐L
Kaipapa'u Stream	☐T ☐W ■N	Concrete Clear Span Bridge Replacement	☐I ■O ☐U	110	57	6,270	☐T ■P ☐L

For dredging activities *(if more than 3 dredge activities proposed, include extended table as an attachment)*:

☐ New dredging ■ Maintenance dredging ☐ N/A, no dredging in navigable waters proposed.

Impacted Navigable Water Name (e.g. Lei Harbor)	**Impacted Water Type** (T/W/N)	**Dredge/Removal Dimensions in Navigable Waters**				**Impact Duration** (T-Temporary, P-Permanent, L-Loss)	**Dredged Material Type** (e.g. sand, mud, rock, etc.)
		Dredged Area Length (ft)	**Dredged Area Width (ft)**	**Dredged Area (sq ft)**	**Dredged Volume (cy)**		
Kaipapaʻu Stream	☐T ☐W ■N	varies	varies	3,800	5 CY in MHHW	■T ☐P ☐L	sediment
Kaipapaʻu Stream	☐T ☐W ■N	26	4	104	5 CY in MHHW	■T ☐P ☐L	concrete center pier wall
	☐T ☐W ☐N					☐T ☐P ☐L	

b. Purpose of the Proposed Activity:

The existing 74-year-old Kaipapaʻu Stream bridge has been evaluated by HDOT as being structurally deficient and presently does not meet design standards. This proposed bridge project is needed to mitigate bridge maintenance concerns, increase traffic safety (for motorists and pedestrians) and meet the projected vehicle usage of the Kamehameha Highway. This project is one in a series of bridge replacements being implemented by the State Department of Transportation and Federal Highway Administration on Oʻahu.

c. Direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure:

See Supplemental Information 4c.

d. Description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity:

See Supplemental Information 4d.

e. Any other NWP(s), or Individual Permit(s) used or intended to be used to authorize any part of the proposed activity or any related activity including other separate and distant crossings for linear projects that require Department of the Army authorization:

N/A.

f. Have sketches been provided containing sufficient detail to show that the activity complies with the terms of the NWP and provide an illustrative description of the proposed activity? ☒ Yes, Attached ☐ No

5. Aquatic Resource Delineation (see Instructions)

a. Has a delineation of aquatic resources(wetlands, other special aquatic sites, and other waters, such as perennial, intermittent, ephemeral streams and navigable waters i.e. harbors, shoreline, ocean) been conducted in accordance with the current method required by the Corps? ☒ Yes ☐ No ☐ N/A, project located entirely in marine waters with no associated upland activities (e.g. buoy, marine bore, etc.)

If yes, please attach a copy of the delineation **See Supplemental Information 4c**

Note: If no, your PCN is not complete. In accordance with General Condition 32, you may request the Corps delineate the special aquatic sites and other waters on the project site, but there may be a delay. In addition, the PCN will not be considered complete until the delineation has either been submitted to or completed by the Corps, as appropriate.

b. If a delineation has been submitted, would you like the Corps to conduct a jurisdictional determination (preliminary or approved)? ☐ Yes ☒ No

If yes, please complete, sign and return the attached *Appendix 1 – Request for Corps Jurisdictional Determination (JD)* sheet or provide a separate attachment with the information identified in Appendix 1.

6. Compensatory Mitigation (see Instructions)

a. Will the proposed activity result in the loss of greater than 1/10-acre of wetlands? ☐ Yes ☒ No

Note: In accordance with Regional Condition 3, permanent losses of waters of the U.S. greater than 1/10-acre are prohibited.

If yes, describe how you propose to compensate for the loss of each type of wetland:

Note: For the loss of less than 1/10 acre of wetlands, or if no compensatory mitigation is proposed, the Corps may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in no more than minimal adverse environmental effects.

b. Will the proposed activity result in the loss of streams or other open waters of the U.S.? ☐ Yes ☒ No

Note: In accordance with Regional Condition 7.2, your PCN must you must provide a written discussion of the on-site design configurations considered to demonstrate avoidance and minimization of impacts was evaluated and that the proposed permanent loss is unavoidable. See Box 12, below.

If yes, provide a description of any proposed compensatory mitigation for the loss of each type of stream or other open water:

Note: If no compensatory mitigation is proposed, the Corps may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in no more than minimal adverse environmental effects.

7. Endangered Species Act (ESA) Compliance (see Instructions)

a. For non-Federal permittees (if Federal permittee, check N/A and skip to 7(b))**:** ☐ N/A

(1) Are there any Federally-listed or proposed endangered or threatened species known or likely to occur within or near the project area? ■ Yes, see species list below ☐ No (If unknown, contact your local U.S. Fish & Wildlife Service office and/or National Marine Fisheries Service office.)

(2) Is the activity located in designated critical habitat for Federally-listed endangered or threatened species? ☐ Yes, see species list below ■ No (If unknown, contact your local U.S. Fish & Wildlife Service office and/or National Marine Fisheries Service office.)

If yes to either (1) or (2), include the name(s) of those endangered or threatened species below:

1. Hawaiian Monk Seal (Monachus schauinslandi)	2.
3.	4.
5.	6.
7.	8.
9.	10. See also Supplemental Information 4c. and 4d.

If no to both (1) and (2), proceed to Box 8.

Note: If yes to either (1) or (2), note per General Condition 18(c), you shall not begin work on the activity until notified by the Corps that the requirements of the ESA have been satisfied and that the activity is authorized.

b. For Federal permittees, you must provide documentation demonstrating compliance with ESA as a separate attachment. ■ Enclosed See Attachment E, Attachment 5, Endangered Species Act Section 7 Consultation

8. Historic Properties (see Instructions)

a. For non-Federal permittees (if Federal permittee, check N/A and skip to 8(b))**:** ☐ N/A

(1) Is there a known historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places within or near the project area? ■ Yes ☐ No (If unknown, contact your local State Historic Preservation Officer.)

If yes to (1), include the name(s) of historic property(ies) below:

1. Human burial (State Site 50-80-06-4796)	2.
3. Kaipapaʻu Stream Bridge	4.
5.	6. See also Supplemental Information 8a.

OR

■ A vicinity map indicating the location of the historic property is enclosed

(2) If no to (1), describe the potential for the proposed work to affect a previously unidentified historic property:

Note: If yes to (1), note per General Condition 20(c), you shall not begin the activity until notified by the Corps that the activity has no potential to cause effects or that consultation under Section 106 of the National Historic Preservation Act (NHPA) has been completed.

b. For Federal permittees, you must provide documentation demonstrating compliance with NHPA in a separate attachment. ■ Enclosed See Attachment E, Attachment 7, National Historic Preservation Act Section 106

9. National Wild and Scenic Rivers

N/A. There are no designated Wild and Scenic Rivers in any state or territory of the Honolulu District

10. Section 408 Permissions (see Instructions)

a. Will the proposed activity also require permissions from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a Corps federally authorized Civil Works project? ☐ Yes ☒ No

If yes, have you received Section 408 permission to alter, occupy, or use the Corps project? ☐ Yes ☐ No

If yes, please attach the Section 408 permission

Note: If yes, note per General Condition 31, an activity that requires Section 408 permission is not authorized by NWP until the Corps issues the Section 408 permission to alter, occupy, or use the Corps project, and the Corps issues a written NWP verification.

11. Compliance with NWP General Conditions (required)

Instructions: To qualify for NWP authorization, your project must comply with the NWP General Conditions. Read the General Conditions. Indicate below your rationale for compliance with each general condition. Conditions are listed below to reflect each corresponding NWP General Condition number.

General Condition	Rationale for Compliance with General Condition
1. Navigation	N/A. The water is not considered as navigable by vessels due to the limited depth and reach of stream waters. The stream depths in the project location vary from one to three feet.
2. Aquatic Life Movements	The activity will not disrupt necessary life cycle movements of indigenous species.
3. Spawning Areas	There are no spawning areas within the project site.
4. Migratory Bird Breeding Areas	There are no migratory bird breeding areas within the project site.
5. Shellfish Beds	There are no shellfish beds within or near the project site.
6. Suitable Material	All materials used for the proposed project shall be clean, uncontaminated materials. No materials containing toxic or hazardous substances shall be allowed for use or be discharged into Waters of the U.S. (WOUS).
7. Water Supply Intakes	N/A. The Kaipapaʻu Stream is not used for public water supply intake.
8. Adverse Effects from Impoundments	N/A. The proposed activityis does not create an impoundment.
9. Management of Water Flows	The pre-construction course, condition, capacity, and location of WOUS will be maintained for each activity. Bridge design will be at or above base flood elevations established under the National Flood Insurance Program, and conform to the “no-rise” requirements of FEMA.
10. Fills Within 100-Year Floodplains	The project site is located within a Flood Zone AE, 100-year Floodplain. The project will comply with applicable FEMA-approved state and local floodplain management requirements.
11. Equipment	No work is proposed in wetland or mud flat areas. Sediment that has accumulated will be dredged using a single-scoop method of excavation with the equipment staged in uplands above the MHHW and OHWM.
12. Soil Erosion and Sediment Controls	Appropriate soil erosion and sediment controls will be installed prior to construction and will be used and maintained in proper operating conditions during construction, and all exposed soils and fills will be permanently stabilized.
13. Removal of Temporary Fills	Upon completion of in-stream work, the sandbags and temporary concrete Acrow detour bridge will be removed and the stream returned to pre-construction conditions.
14. Proper Maintenance	The new Kaipapaʻu Stream Bridge structure will be properly maintained to ensure public safety. Additionally, the proposed minor maintenance dredging will remove accumulated sediment and improve stream flows.
15. Single and Complete Project	The subject project is considered a single and complete project as defined by USACE. The subject NWP 3 and NWP 14 will only apply to the subject project.
16. Wild and Scenic Rivers	*N/A*
17. Tribal Rights	*N/A*

18. Endangered Species	*See Box 7 above.*
19. Migratory Bird and Bald and Golden Eagle Permits	The project will not result in the taking of the migratory birds which may inadvertently be observed at the project site.
20. Historic Properties	*See Box 8 above.*
21. Discovery of Previously Unknown Remains and Artifacts	In the unlikely event that any historical or cultural resources are discovered, the SHPD and the district engineer shall be immediately notified. All work within the discovery area shall be immediately halted until such time that the disposition of the find can be determined.
22. Designated Critical Resource Waters	The Kaipapaʻu Stream is not considered a critical resource water by NOAA, nor is it a NOAA-managed marine sanctuary or National Estuarine Research Reserve.
23. Mitigation	*See Boxes 4(d) and 6 above.*
24. Safety of Impoundment Structures	N/A. No impoundment structures are proposed.
25. Water Quality	State certifying agency contacted? ☐ Yes ☒ No See Attachment E, Attachment 1 Water quality certification (WQC) status: ☐ Pending; application submitted on _______ ☐ Issued on _______; attached to PCN. ☒ Waived on _______; attached to PCN Note: Only the state has the authority to determine whether a WQC is required for your project. You are responsible for obtaining WQC, if required by the state. Contact the appropriate state certifying agency as early as possible. The Corps cannot proceed with NWP authorization without a WQC or waiver.
26. Coastal Zone Management (CZM)	State certifying agency contacted? ☐ Yes ☒ No CZM consistency determination status: ○ Pending; application submitted on ________ ○ Issued on _______; consistency concurrence attached to PCN. Note: Only the state has the authority to determine whether your project is consistent with the state's CZM plan. It is your responsibility to obtain a CZM consistency determination, if required. Contact the appropriate state agency as early as possible. The Corps cannot proceed with NWP authorization without a CZM consistency concurrence.
27. Regional and Case-by-Case Conditions	Construction activities related to the subject project will comply with regional conditions set forth by the USACE Honolulu District.
28. Use of Multiple Nationwide Permits	The proposed project will require use of NWP 3 (Maintenance) and NWP 14 (Linear Transportation Projects) for the proposed work above and within stream waters. No loss of WOUS will occur.
29. Transfer of Nationwide Permit Verifications	*N/A*
30. Compliance Certification	*N/A*
30. Activities Affecting Structures or Works Built by the U.S.	*See Box 10 above.*
32. Pre-Construction Notification	*Completion of this template complies with this condition and RC 6.*

12. Compliance with NWP Regional Conditions (required)

Instructions: To qualify for NWP authorization, your project must comply with the POH NWP Regional Conditions. Read the Regional Conditions. Complete the sections below to indicate your compliance with each Regional Condition. Conditions are listed below to reflect each corresponding POH NWP Regional Condition number.

Regional Condition	Rationale for Compliance with Regional Condition
1. Revoked Permits	■ The NWP(s) specified in Box 3, above is/are not revoked from use in the Honolulu District.
2. Limited Use Areas	☒ There are no limited use areas present within or in the vicinity of the project. ☐ The following limited use areas are present within or in the vicinity of the project: ___________
3. Acreage Limitation	■ No permanent discharge of dredged or fill material into waters of the U.S. greater than 0.10 acres proposed
4. Stream Channelization and Impoundment Restriction	■ No permanent stream channelization proposed. ■ No permanent construction of a dam to impound waters of the U.S. proposed
5. NWP Verification	*Submission of this template initiates the process to obtain NWP Verification, per RC 5.*
6. PCN	*Completion of this template complies with RC 6*

7. Additional PCN Information	For Federal permittees, you must provide documentation demonstrating EFH compliance as a separate attachment. ■ Enclosed See Attachment E, Attachment 5, Endangered Species Act Section 7 Consultation For non-Federal permittees, please complete Sections 7.1 (a-c), below.
	7.1(a) ☐ N/A, no listed species known or likely to occur (see box 7(a)(1), above); skip to 7.1(b). i. See species list: ■ at box 7(a)(2), above; OR ■ attached See Supplemental Information 4c & 4d ii. ■ Proposed BMPs to avoid/minimize impacts to listed species are attached. ☐ No BMPs to avoid/minimize impacts to listed species proposed.
	7.1(b) ☐ N/A, No activity in tidal waters proposed; skip to 7.1(c). i. EFH occurs in the project area for the following Management Unit Species: ☐ Bottomfish ☐ Crustaceans ☐ Pelagics ☐ Coral Reef Ecosystem ☐ Seamount Groundfish ☐ Precious Corals (PC) (If unknown, contact your local National Marine Fisheries Service office) ii. Existing environment: Bottom substrate (sand, cobbles, silt, etc.): Silt, cobbles, sand Water depth: 3 feet Distance from shore: 300 feet Tidal Range: ■ Intertidal ☐ Subtidal ☐ Submerged Water Quality (clear, brackish, murky, etc.): Brackish iii. ■ Proposed BMPs to avoid/minimize impacts to EFH are attached. ☐ No BMPs to avoid/minimize impacts to EFH proposed. See Supplemental Information 4c & 4d
	7.1(c) ☐ N/A, no historic properties (see box 8(a)(1), above); skip to 7.2. i. Associated upland activities proposed (staging, stockpiling, temporary access, entry/exit pits, etc.): See Box 4a above. ☐ No activities in uplands associated with this project proposed. ii. See historic property(ies) list ■ at box 8(a), above OR ■ attached See Supplemental Information 8a iii. The following NHOs, community members or other parties may want to provide comment on this project: SHPD and Ko'olauloa Neighborhood Board No. 28 ☐ No knowledge of any NHOs, community members or others interested in providing comment. iv. ■ Correspondence with ■ SHPO, ☐ NHO, ■ Other Ko'olauloa Neighborhood Board No. 28, attached. ☐ No parties consulted prior to PCN submittal. v. To meet RC 7.1(c), the following documents, libraries or databases were searched: ______ vi. ■ Proposed BMPs to avoid/minimize/mitigate impacts to historic properties are attached ☐ No BMPs to avoid/minimize/mitigate impacts to historic properties proposed.
	7.2 ■ N/A, No permanent loss of waters of the U.S. proposed; skip to 8.1(a). ☐ The proposed permanent loss of waters of the U.S. is unavoidable. The following on-site design configurations were considered and deemed infeasible (rationale provided): ______. ☐ See attached sketch depicting other configuration(s) considered (*optional*)
8. Best Management Practices	8.1 (a) ■ Applicable, will implement or ☐ Not applicable
	8.2 (a) ■ Applicable, will implement or ☐ N/A (b) ■ Applicable, will implement or ☐ N/A (c) ■ Applicable, will implement or ☐ N/A (d) ■ Applicable, will implement or ☐ N/A (e) ■ Applicable, will implement or ☐ N/A (f) ■ Applicable, will implement or ☐ N/A
	8.3 (a) ■ Applicable, will implement or ☐ N/A
9. Bank Stabilization	9.1 ■ N/A, No stream bank stabilization proposed. ☐ An environmentally-sensitive stabilization technique is proposed. See box 4, above. ☐ An environmentally-sensitive stabilization technique is not proposed. The following techniques were considered and deemed not practicable (rationale provided): ______
	9.2 ■ N/A, I am not proposing shoreline stabilization ☐ I am proposing an environmentally-sensitive stabilization technique. See box 4, above. ☐ I am not proposing an environmentally-sensitive stabilization technique because I determined the following techniques I considered below, not practicable: ______

Instructions for the Honolulu District
Nationwide Permit Pre-Construction Notification (PCN):

This PCN template integrates requirements of the U.S. Army Corps of Engineers (Corps) Nationwide Permit (NWP) Program with the Honolulu District (POH) NWP Regional Conditions for regulated activities located within POH's area of responsibility. The POH Regulatory Branch recommends this PCN template be used by prospective permittees who are seeking verification under the 2017 NWPs. Should you choose to submit your PCN using an alternate format, it must contain all information requirements identified at NWP General Condition 32(b) and Regional Conditions 2, 7 and 9 (Attachment 1).

Boxes 1-10 should be completed to include all information required by NWP General Condition 32. Boxes 11 and 12 (or other sufficient information to show compliance with all NWP General and POH Regional Conditions) should also be completed to facilitate efficient permit evaluation.

If additional space is needed, provide as an attachment to the PCN template.

Box 0: This box is to be completed by the Corps, skip. Continue to Box 1.

Box 1: Box 1 must be completed to provide the contact information of the prospective permittee, as required by General Condition 32.

Box 1(a): As identified in General Condition 32(b)(1), the PCN must contain the name, mailing address, and telephone number of the prospective permittee. The email address of the prospective permittee is not required, but is recommended.

Box 1(b): If the prospective permittee chooses to have an agent, the contact information for the agent may be provided here.

Box 1(c): If the prospective permittee would like to designate his or her agent, identified in Box 1(b), as the primary point of contact for the Corps and to act on his or her behalf in obtaining the NWP, the prospective permittee must fill out Box 1(c). If Box 1(c) is not completed, the Corps will only contact the prospective permittee. The individual identified in Box 1(c) must match the individual identified in Box 1(b)

Box 2: Box 2 must be completed to provide the location of the proposed activity, per General Condition 32(b)(2). If the proposed work would involve multiple single and complete projects, check the box, and provide the location information identified in Boxes 2-10, and 11-12, as applicable, in a separate attachment.

For multiple single and complete projects, a table identifying the location of each project is recommended. Submittal of the GIS shapefiles with the location of each project is recommended, but is not required. *Single and Complete Linear Project* and *Single and Complete Non-Linear Project* are defined in the *Definitions* section of the 2017 NWPs. For questions regarding the definition of single and complete project, please contact the POH Regulatory Branch.

Box 2(a): Provide the name of the proposed activity. For example: Makai Harbor Pier A Repair, Mauka Stream Bank Stabilization, Aina Residential Development Project.

Box 2(b): Provide the City, County, Island and State/Territory where the proposed activity is located.

Box 2(c): Provide the name of the nearest waterbody to the proposed activity or the waterbody proposed for impact, if known.

Box 2(d): Provide the coordinates of the proposed activity if known. The coordinates should be provided using NAD 83, and in decimal degrees.

Box 2(e): This box should be completed if the coordinates of the proposed activity are not known, and should be sufficient for the Corps to determine the location of the proposed activity. This may include the project physical address, TMK number, etc. If there is an existing Corps' file or identification number (e.g. POH-2017-00001 for the site, please provide that information here.

Box 2(f): This box should be completed if the coordinates of the proposed activity are not known, and should be sufficient for the Corps to determine the location of the proposed activity.

Box 3: Per General Condition 32(b)(3), the prospective permittee must identify the specific NWPs requested to authorize the proposed activity. You must read the NWP terms to ensure your proposed activity is eligible under your requested NWP, including any applicable general or regional conditions. Please note the Corps will make the final determination on the evaluation of the appropriate NWP to be used, whether the proposed activity meets the terms and conditions of the NWP, and whether the effects of the proposed activity would result in no more than minimal adverse environmental effects, individually and cumulatively. The NWP terms, general and regional conditions are on the Honolulu District Regulatory website at: http://www.poh.usace.army.mil/missions/regulatory/.

Box 4: General Condition 32(b)(4) requires the PCN contain the following:

> *a description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);*

If the proposed activity would involve multiple single and complete projects, provide the information identified in Boxes 4(a) – (e) for each single and complete project in a separate attachment. For multiple single and complete projects, a table identifying the impacts to waters of the U.S. for each single and complete linear project should be submitted, which may be done by creating a table or similar format. Single and Complete Linear Project and Single and Complete Non-Linear Project are defined in the *Definitions* section of the NWPs. For questions regarding the definition of single and complete project, please contact your District regulatory office.

Box 4(a): This box should include a complete description of the proposed activity, identifying especially those actions in waters of the U.S. that require authorization from the Corps (discharge of dredged or fill material in waters of the U.S.; work and/or structures in, over, under or affecting navigable waters). The Corps evaluates the proposed activity, to include the means and methods, the construction window and sequence, associated upland activities (staging, stockpiling, temporary access, dewatering, disposal and borrow sites, etc.) and any other information that identifies activities that require a permit.

You may complete the table in this box as is applicable to your proposed activity to document impact quantifications. The first table is for discharges of dredged or fill material in waters of the U.S., the second table is for structures in navigable waters and the third table is for dredging activities in navigable waters. For each impact you are proposing, fill out a corresponding row in the applicable table. For example, a tidally influenced streambank stabilization project may involve the following three activities: sandbag berm for stream diversion (temporary discharge of fill material in navigable waters of the U.S.), excavated revetment toe (dredging in navigable waters), boulder revetment (permanent discharge of fill material in navigable waters of the U.S.), therefore you would complete two separate entries in the first table for each fill activity and a single entry in the third table for the dredging work. For those tables that are not applicable because you are not proposing that type of regulated activity, do not complete and indicate by checking "N/A".

For the first table, you must identify the impacted water name and type, the activity resulting in the discharge of dredged or fill material, the dimensions of the fill within the jurisdictional limits of a water of the U.S., whether the discharge is temporary or permanent, and if permanent, whether there is an anticipated loss of waters of the U.S. and the type of fill material being discharged.

For the second table, you must identify the impacted navigable water name and type, the type of structure and its material, the structures' position relative to the navigable water, either in, over or under, the dimensions of the structure within the jurisdictional limits of a navigable water, and whether the structure is temporary or permanent.

For the third table, you must identify whether your proposed action involves new dredging or maintenance dredging, the impacted navigable water name and type, the dimensions of the dredge removal area and the volume and type of material to be dredged.

Note for impacted water type, more than water type may describe the impacted water. For example, the tidally influenced mouth of Aloha Stream would be both a tributary and a navigable water and tidal wetlands would be both a wetland and a navigable water. Select all that apply.

Note for permanent losses of waters of the U.S., a loss of waters of the U.S. occurs when a discharge of dredged or fill material permanently converts a water of the U.S., or a portion of a water of the U.S. to a non-water of the U.S. i.e., upland). The activity results in permanent loss of that water of the U.S., in terms of area and function. Conversion of one AR type to another is not considered a "permanent loss". Temporary conversion of a water of the U.S. to uplands with removal and restoration back to a water of the U.S. is not considered a "permanent loss". An "impact" refers to a broader category of effects on or changes to waters of the U.S. Impacts may be permanent or temporary and do not necessarily convert an aquatic resource to uplands. Not all impacts are permanent losses. A temporary impact will never result in a permanent loss of waters of the U.S.; therefore, permanent losses will ONLY be associated with permanent impacts.

Box 4(b): This box should describe the purpose of the proposed activity. For example: The purpose of a culvert replacement may be to restore drainage or hydraulic capacity.

Box 4(c): This box should describe the direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of each type of water of the U.S. expected to result from the NWP activity. "Loss of waters of the U.S." and "loss of stream bed" are defined in the *Definitions* section of the 2017 NWPs. For questions regarding the definition "loss of waters of the U.S." or "loss of stream bed," please contact the POH Regulatory Branch. For activities that would result in the discharge of dredged and/or fill material into waters of the U.S. subject to Section 404 of the Clean Water Act, include in this box the acreage (and linear feet for streams or other linear aquatic resources) of each aquatic resource type that would be filled.

Your discussion of direct and indirect adverse environmental effects should reflect your consideration of the anticipated impacts the proposed activity could have on the impacted water and on the resources identified in Boxes 7, 8 and 12, Regional Conditions 2 and 7. If you are proposing measures to avoid and/or minimize impacts to such resources, you may discuss the avoided or minimized impacts in Box 4(d).

Identify for each discharge whether the fill would be permanent or temporary (i.e. fill would be removed following construction and the fill area would be restored to pre-activity contours and conditions). For temporary fills, identify when the fill in waters of the U.S. is proposed to be removed, and the methods proposed to remove the fill/restore the area to pre-activity contours and conditions. In addition, identify the adverse environmental effects outside of the direct impact area that would occur, including the acreage of each type of water.

For activities that would result in work or the placement of structures in, over, under or affecting a navigable water of the U.S. subject to Section 10 of the Rivers and Harbors Act, include a description of the proposed work and the adverse environmental effects, including the acreage of the navigable water(s) that would be directly affected and the adverse effects cause by this activity. Identify for each structure, whether use in navigable waters would be permanent or temporary (i.e. structure would be removed from navigable waters following construction or structure is permanent). In addition, identify the indirect effects that would occur to the navigable waterway outside of the direct impact area.

Box 4(d): Include in this box any proposed mitigation measures intended to reduce adverse environmental effects caused by the proposed activity. Measures may include, a description of any best management practices (BMPs) proposed to minimize effects to downstream waters of the U.S., avoidance and/or preservation of waters of the U.S. on the project site; installation and maintenance of erosion control measures; and any other measures proposed. Do not include compensatory mitigation proposed to compensate for the loss of waters of the U.S., as this will be identified in Box 6.

Box 4(e): Identify any other NWP(s), Regional/Programmatic General Permit(s), or Individual Permit(s) used or intended to be used to authorize any part of the proposed activity or any related activity. If the proposed activity is part of a larger overall project that would require authorization under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act, identify the other permits proposed to be used here. This includes other separate and distant crossings for linear projects that require DA authorization but do not require pre-construction notification.

Box 4(f): Identify if sketches have been provided containing sufficient detail to provide an illustrative description of the proposed activity. Please note that specific requirements for drawings are required by the POH and are available on the Honolulu District Regulatory Website.

Box 5: Regional Condition 32(b)(5) requires the PCN include a delineation of wetlands, other special aquatic sites, and other waters.

Box 5(a): Identify whether a delineation of the jurisdictional limits and boundaries of aquatic resources has been conducted in accordance with the current method required by the Corps. Wetland delineations must be conducted in accordance with the technical procedures and guidance described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1) and the 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Hawai'i and Pacific Islands Region*, Version 2.0. If a delineation of aquatic resources has been completed, a copy should be attached. If a delineation of aquatic resources has not been completed, the PCN is not complete. You may request the Corps delineate the special aquatic sites and other waters on the project site, but there may be a delay. In addition, the PCN will not be considered complete until the delineation has either been submitted to or completed by the Corps, as appropriate.

Note, the Corps' jurisdictional limits are as follows:

For Section 10 of the Rivers and Harbors Act of 1899: Mean High Water Mark elevation (33 CFR 329.12).

For Section 404 of the Clean Water Act: Ordinary High Water Mark for tributaries (streams, rivers), approved wetland boundary for wetlands, High Tide Line for navigable waters. The terms "Ordinary High Water Mark" and "High Tide Line" are defined in the *Definitions* section of the 2017 NWPs.

Note that the only exception to this requirement are those activities occurring entirely in the Pacific Ocean and that have no associated upland activities. Examples of such activities not requiring a delineation include deployment of buoys for vessel moorage, data collection or similar use, seafloor boring (not to include drilling activities that have an on-land entry or exit pit), or similar independent, marine activities or structures. For activities occurring along the shoreline, in marine waters of the Pacific Ocean, a delineation is required.

Box 5(b): If a delineation of aquatic resources has been submitted, identify whether you would like the Corps to conduct a jurisdictional determination (preliminary or approved). If yes, you must complete, sign, and return the enclosed *Appendix 1 – Request for Corps jurisdictional Determination (JD)* sheet, or provide a separate attachment with the information identified in Appendix 1 (Attachment 2). For questions regarding jurisdictional determinations, please contact the POH Regulatory Branch.

Note that a jurisdictional determination is not required to apply for and receive coverage under a NWP.

Box 6: General Condition 32(b)(6) requires, if the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee submit a statement describing how the mitigation requirements of General Condition 23 will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

If the proposed activity would involve multiple single and complete projects, provide the information identified in 6(a) and 6(b) for each single and complete project in a separate attachment. For multiple single and complete projects, a table identifying the proposed compensatory mitigation for each single and complete project should be submitted.

Box 6(a): Identify whether the proposed activity would result in the loss of greater than 1/10-acre of wetlands. The definition of "loss of waters of the U.S." may be found in the *Definitions* section of the 2017 NWPs.

Be advised, POH Regional Condition 3, Acreage Limitation prohibits permanent losses of waters of the U.S. greater than 1/10-acre resulting from the discharge of dredged or fill material. Note that for the loss of less than 1/10-acre of wetlands, or if no compensatory mitigation is proposed, the Corps may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

Box 6(b): Identify whether the proposed activity would result in the loss of streams or other open waters of the U.S. The definition of “loss of waters of the U.S.” and “loss of stream bed” may be found in the *Definitions* section of the 2017 NWPs. If the proposed activity would result in the loss of streams or other open waters of the U.S., provide a description of any proposed compensatory mitigation for the loss of each type of stream or other open water. This includes the type of compensatory mitigation (e.g. purchase of mitigation bank or in-lieu fee credits) or permittee responsible establishment, re-establishment, rehabilitation, enhancement or preservation for each stream or open water type (e.g. intermittent drainage, pond, lake). If preservation is proposed as compensatory mitigation, identify how the proposed preservation meets the 5 criteria listed in 33 CFR 332.3(h). Note that if no compensatory mitigation is proposed, the Corps may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in no more than minima adverse environmental effects.

Box 7: POH Regional Condition 7 requires non-Federal permittees to provide a list of Federally-listed or proposed endangered or threatened species known or likely to occur within or near the project area. Completion of Box 7 fulfills the requirement at General Condition 32(b)(7). Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act (ESA). For questions regarding federally-listed species, critical habitat, or ESA, please contact the local NOAA Fisheries office, U.S. Fish and Wildlife Service, or the POH Regulatory Office Branch.

If the proposed activity would involve multiple single and complete projects, provide the information identified in Boxes 7(a) – (d) (as applicable) for each single and complete project in a separate attachment.

Box 7(a): To be completed by non-Federal prospective permittees. Identify (1) Federally-listed or proposed endangered or threatened species known or likely to occur within or near the project area; (2) if the activity is located in designated critical habitat for Federally-listed endangered or threatened species; and if yes to (1) or (2), identify the name(s) of those endangered or threatened species known or likely to occur within or near the project area or that might utilize the designated critical habitat. If no to both (1) and (2), proceed to Box 8.

Note that if the answer to (1) or (2) is yes, per General Condition 18(c), the non-Federal permittee shall not begin work on the activity until notified by the Corps that the requirements of the ESA have been satisfied and that the activity is authorized.

Box 7(b): Federal permittees should provide documentation demonstrating compliance with ESA as a separate attachment. Per General Condition 32(b)(7), if documentation showing compliance with the ESA is not submitted by the federal permittee, the PCN will not be complete.

Box 8: POH Regional Condition 7 requires non-Federal permittees to provide a list of historic property(ies) listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places within or near the project area or include a vicinity map indicating the location of the historic property. Completion of Box 8 fulfills the requirement at General Condition 32(b)(7). Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act. For questions regarding historic properties, including cultural resources, please contact your State Historic Preservation Officer or the POH Regulatory Branch.

If the proposed activity would involve multiple single and complete projects, provide the information identified in Boxes 8(a) – (d) (as applicable) for each single and complete project in a separate attachment.

Box 8(a): To be completed by non-Federal prospective permittees. Identify (1) if there is a known historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places that the NWP within or near the project area. If yes, state which historic property(s) occur within or near the project area, or check the box and provide a vicinity map of the location of the historic property. If no to (1), describe the potential for the proposed work to affect a previously unidentified historic property, if known.

Note that if the answer to (1) is yes, per General Condition 20(c), the non-Federal permittee shall not begin work on the activity until notified by the Corps that the activity has no potential to cause effects or that consultation under Section 106 of the National Historic Preservation Act (NHPA) has been completed.

Box 8(b): Federal permittees should provide documentation demonstrating compliance with NHPA as a separate attachment. Per General Condition 32(b)(8), if documentation showing compliance with the NHPA is not submitted by the federal permittee, the PCN will not be complete.

Box 9: General Condition 32(b)(9) requires that, for an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the ''study river.'' However, there are no designated Wild and Scenic Rivers in any state or territory of the Honolulu District; accordingly, this condition is not applicable.

Box 10: General Condition 32(b)(10) requires that for an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the PCN must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that Corps project.

If the proposed activity would involve multiple single and complete projects, provide the information identified in 10(a) for each single and complete project in a separate attachment.

Box 10(a): Identify if the NWP will also require permissions from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a Corps federally authorized Civil Works project. If yes, identify if the prospective permittee has received Section 408 permission to alter, occupy, or use the Corps project, and attach the Section 408 permission.

Note per General Condition 31, an activity that requires Section 408 permission is not authorized by NWP until the Corps issues the Section 408 permission to alter, occupy, or use the Corps project, and the Corps issues a written NWP verification.

Box 11: To qualify for authorization under a NWP, your project must comply with all applicable NWP General Conditions. You must read the NWP General Conditions to ensure your project is compliant. Box 11 contains a list of each General Condition, numbered in accordance with the listing in the Federal Register. You must indicate your rationale for compliance with General Conditions 1 through 32 of the NWPs. This information, as applicable, may be provided through completion of Box 11, or as a separate attachment. Those general conditions that have no applicability in the Honolulu District or that are completed elsewhere on the PCN have been completed for you. All others may apply, depending on the proposed activity and should be filled out accordingly. Completion of this information may assist the District in determining whether the proposed activity meets the General Conditions of the NWP, would result in no more than minimal adverse environmental effects and is eligible for authorization under a NWP.

If the proposed work would involve multiple single and complete projects, provide the information identified in Box 11 for each single and complete project in a separate attachment.

Box 12: To qualify for authorization under a NWP, your project must comply with all applicable POH Regional Conditions. You must read the POH Regional Conditions to ensure your project is compliant. Box 12 contains a list of each Regional Condition, numbered in accordance with the listing of POH Regional Conditions. You must indicate your rationale for compliance with Regional Conditions 1 through 9 issued by the Pacific Ocean Division Commander, effective March 19, 2017. This information, as applicable, may be provided through completion of Box 12, or as a separate attachment. Those regional conditions that are completed elsewhere on the PCN have been completed for you. All others may apply, depending on the anticipated impacts of your proposed activity and should be filled out accordingly. Completion of this information may assist the District in determining whether the proposed activity meets the Regional Conditions of the NWP, would result in no more than minimal adverse environmental effects and is eligible for authorization under a NWP. Note Regional Conditions 2, 7 and 9 require additional information to be provided on the PCN; such information is required to constitute a complete PCN.

If the proposed work would involve multiple single and complete projects, provide the information identified in Box 12 for each single and complete project in a separate attachment.

Honolulu District, U.S. Army Corps of Engineers
Regulatory Branch

DEPARTMENT OF THE ARMY NATIONWIDE PERMIT (NWP)
PRE-CONSTRUCTION NOTIFICATION (PCN) REQUIREMENTS
(*Reference Volume 82, Page 2003, General Condition 32(b) of the Federal Register and the Honolulu District NWP Regional Conditions, effective March 19, 2017*)

In order for this office to evaluate eligibility of your project for authorization under a NWP, your PCN must be in writing (electronic or paper format) and must contain the following information to be considered complete. The numbers used below correspond to the assigned general or regional condition number:

To comply with General Condition 32(b):

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (*e.g.,* a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1⁄10-acre[2] of wetlands and a PCN is required[3], the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan;

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification[3], Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity

or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification[3], Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the "study river"[4] (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office[5] having jurisdiction over that USACE project

To comply with NWP Regional Condition 2:

(2) You must identify in your PCN if any of these resources occur within or in the vicinity of your project area. In Honolulu District Area of Responsibility: National Wildlife Refuges, Hawaii Wildlife Sanctuaries, Hawaii Marine Life Conservation Districts, Guam Marine Preserve Areas and CNMI Marine Protected Areas. In Hawaii: Anchialine Pools, Montane Bogs, Natural Freshwater and Saline Lakes. In Guam: Aquatic areas containing Nipa palms (*Nypa fruticans*). In Guam, CNMI and American Samoa: Mangroves, Saline Lakes, Sea/Freshwater Caves (Allogenic Streams, Cenotes, Phreatic Zones, Sinkholes, Stream Caves, and Vadose Shafts).

To comply with NWP Regional Condition 7:

(7.1) For Federal permittees, your PCN must provide documentation demonstrating compliance with the Essential Fish Habitat provisions of the Magnuson-Stevens Fishery Management and Conservation Act. For non-Federal permittees, in addition to the requirements at GC #18, #20 and #32, your PCN must contain the following information to demonstrate your avoidance and minimization of adverse impacts to wetlands, other special aquatic sites and other waters, and if applicable, endangered species, essential fish habitat and historic properties, including cultural resources. The level of detail submitted in your PCN shall be commensurate with the anticipated degree of project-related impacts.

a. For activities where federally-listed or proposed threatened and endangered species or critical habitat, are known or likely to occur within the project area, the PCN must contain the following information:

i. A list of species, both listed and proposed for listing, and critical habitat, known to occur within and in the near vicinity of the project impact area. Information on the location of threatened and endangered species and their critical habitat and potential project-related impacts to these resources can be obtained directly from the Pacific Islands U.S. Fish & Wildlife Service Office and National Marine Fisheries Service Pacific Islands Regional Office.

ii. Best Management Practices (BMPs) proposed to be implemented throughout the duration of construction to avoid and/or minimize adverse impacts to threatened and endangered species.

b. For activities occurring in tidally-influenced nearshore and marine environments, the PCN must contain the following information:

i. A list of Management Unit Species and associated Essential Fish Habitat (EFH) occurring within and in the near vicinity of the project impact area. Information on the location of EFH and potential project-related impacts to these resources can be obtained directly from your local National Marine Fisheries Service office.

ii. A description of the existing environment within and in the near vicinity of the project impact area: characterization of the benthic substrate (seafloor or stream bed e.g., sand, cobbles, silt, etc.), water depth, distance from shore, tidal range (intertidal, subtidal, submerged), general characterization of water quality (temperature range, salinity, water circulation, turbidity).

iii. Measures to avoid and/or minimize adverse impacts to EFH and proposed mitigation, if applicable.

c. For activities that might have the potential to cause effect to historic properties, including cultural resources, listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties, the PCN must contain the following information:

i. A description of any associated upland activities proposed under the same project.

ii. A list of any known historic properties within the project area and in the near vicinity listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic places. Information on the location of historic properties including cultural resources and potential project-related impacts to these resources can be obtained directly from your local State Historic Preservation Officer.

iii. A list of any Native Hawaiian Organizations, community members, or other parties you think may have an interest in providing comment on the impact the proposed activity may have on cultural resources. Any information you may have related to historic or current cultural use or importance at or near the project site.
iv. Copies of any correspondence from the State Historic Preservation Officer, any NHO, or other party consulted with regarding the potential impacts of the proposed activity on historic properties, including cultural resources.
v. A list of resources, (e.g. published documents, assessments, surveys, etc.) reviewed to provide response to items i-iii, above.
vi. BMP measures proposed to be implemented throughout the duration of construction to avoid and/or minimize adverse impacts to historic properties, including cultural resources.

(7.2) For non-Federal and Federal permittees, activities that would result in the permanent loss of wetlands, other special aquatic sites and other waters, you must provide a written discussion of the on-site design configurations that you considered to demonstrate avoidance and minimization of impacts was evaluated and that the proposed permanent loss is unavoidable. Submission of a plan-view sketch depicting the footprint of on-site design configurations overlaying such waters within the project area will assist in the Corps' review of your proposed activity.

To comply with NWP Regional Condition 9:

(9.1) For new bank stabilization projects in streams with vegetated slopes and/or natural bed and bank, vegetative and environmentally sensitive stabilization practices must be used whenever practicable. Documentation of consideration of environmentally sensitive bank stabilization practices must be included in the PCN to demonstrate whether the use of environmentally sensitive stabilization techniques is practicable given site-specific circumstances. Environmentally sensitive stabilization techniques incorporate organic materials to produce functional structure, provide wildlife habitat, and/or provide areas for re- vegetation. Examples of environmentally sensitive bank stabilization practices include, but are not limited to, the use of the following: adequate sized armoring keyed into the toe of the slope with native plantings, or other suitable vegetation, on the banks above; vegetated geogrids; coconut fiber coir logs; live woody vegetated cuttings; fascines or stumps; brush layering; soil lifts. In situations where the use of these stabilization techniques are not practicable (due to high stream flow velocities, for example) stream bank armoring should be designed to incorporate environmentally friendly natural features, if possible. Examples include: vegetated gabions, vegetated gabion mattresses, live cribwalls and joint plantings.

(9.2) For new shoreline stabilization projects, environmentally sensitive designs that provide wave dissipation, interstitial spaces for fish, crustacean and invertebrate habitat, and other environmental benefits must also be used whenever practicable. Documentation of consideration of environmentally sensitive shoreline stabilization practices must be included in the PCN to demonstrate whether the use of environmentally sensitive stabilization techniques is practicable.

Notes:
[1]Wetland delineations must be conducted in accordance with the technical procedures and guidance described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1) and the 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Hawai'i and Pacific Islands Region*, Version 2.0
[2]Regional Condition 3 prohibits permanent losses of waters of the U.S. greater than 1/10-acre
[3]Regional Condition 6 requires any prospective permittee in the Honolulu District to submit a PCN for review in order to obtain authorization under a NWP.
[4]There are no designated Wild and Scenic Rivers in any state or territory of the Honolulu District.
[5]The Corps office having jurisdiction over USACE projects in the Honolulu District is the Civil and Public Works Branch. You may contact that office at (808) 835-

Appendix 1 - REQUEST FOR CORPS JURISDICTIONAL DETERMINATION (JD)

To: Honolulu District, U.S. Army Corps of Engineers (Corps) Regulatory Branch

- I am requesting a JD on property located at: ______________________________
  City: ______________________ County/Island: ______________________
  State/Territory: ☐ HI ☐ AS ☐ GU ☐ CNMI Acreage of Parcel/Review Area for JD: ____________ acres
  Latitude (decimal degrees): ____________________ Longitude (decimal degrees): ______________________
  (For linear projects, please include the center point of the proposed alignment.)

- Please attach a survey/plat map and vicinity map identifying location and review area for the JD.
- ☐ I currently own this property. ☐ I plan to purchase this property.
  ☐ I am an agent/consultant acting on behalf of the requestor.
  ☐ Other (please explain): ______________________________
- Reason for request: (check as many as applicable)
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.
  ☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.
  ☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.
  ☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 1O list and/or is subject to the ebb and flow of the tide.
  ☐ A Corps JD is required in order to obtain my local/state authorization.
  ☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does -not exist over the aquatic resource on the parcel.
  ☐ I believe that the site may be comprised entirely of dry land.
  ☐ Other: ______________________________
- Type of determination being requested:
  ☐ I am requesting an approved JD.
  ☐ I am requesting a preliminary JD.
  ☐ I am requesting a "no permit required" letter as I believe my proposed activity is not regulated.
  ☐ I am unclear as to which JD I would like to request and require additional information to inform my decision.

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the site if needed to perform the JD. Your signature shall be an affirmation that you possess the requisite property rights to request a JD on the subject property.

*Signature: ______________________________ Date: ____________________
- Typed or printed name: ______________________________
  Company name: ______________________________
  Address: ______________________________
  ____
  Daytime phone no.: ______________________________
  Email address: ______________________________

***Authorities**: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USAGE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

Submit your JD request via email to CEPOH-RO@usace.army.mil or via postal mail to
Honolulu District, U.S. Army Corps of Engineers, Regulatory Branch, Building 230, Fort Shafter, Hawaii 96858-5440.
Please contact the Regulatory Branch at (808) 835-4303 or at the email above for any questions regarding this form.

Section 2 –

Nationwide Permit Pre-Construction Notification (PCN) Supplemental Information

4. Description of the Proposed Activity

4a. Complete description of the Proposed Activity:

The State of Hawaiʻi, Department of Transportation, Highways Division (HDOT), is proposing the Kaipapaʻu Stream Bridge Replacement project. The project is located along Kamehameha Highway (State Route 83) near Milepost 21 in the Hauʻula, Island of Oʻahu, Hawaiʻi, and includes replacing the existing Kaipapaʻu Stream Bridge with a new bridge, maintenance dredging and bank stabilization surrounding the Kaipapaʻu Stream (**Figure 1**). A U. S. Army Corps of Engineers (USACE) permit (POH-2005-00342) was obtained on March 17, 2012 and a revised permit verification obtained on September 19, 2014 for the inclusion of a temporary detour bridge (please note that no nourished beach is associated with this project, as is stated in special condition No. 4 in the permit approval letter dated September 19, 2014 - **Attachment F**). The permit expired on March 18, 2017.

Kaipapaʻu Stream Bridge is located approximately 0.3 miles north of Hau'ula Beach Park. The bridge serves northbound traffic (toward Kahuku) and southbound traffic (toward Kaneʻohe) on Kamehameha Highway. The bridge structure has two 40-foot spans and is constructed from reinforced concrete with a wooden pedestrian walkway attached to the mauka (west) side of the bridge. The bridge crosses Kaipapaʻu Stream approximately 300 feet upstream from coastal marine waters. Beneath and makai of the Kaipapaʻu Stream Bridge the stream is tidally influenced. Lands surrounding the bridge are single family residential and commercial in character and are privately owned. Parcels immediately surrounding Kaipapaʻu Stream Bridge are single family residential.

Kaipapaʻu Stream is classified as an interrupted perennial stream. The lower reaches have intermittent flows during the dry season. Stream flow at the project site occurs along the southern bank of the stream/bridge as there are accumulated sediment/soils, rocks and debris on the northern portion of the stream channel directly under the bridge. At the project site, Kaipapaʻu Steam is mostly fresh water. Portions of the project site beneath and downstream of the bridge are tidally influenced as shown in **Attachment A, Jurisdictional Boundary Maps**.

The existing Kaipapaʻu Stream Bridge is deficient due to age and dilapidation, and requires demolition and replacement. The project area required for construction would be approximately 1.6 acres (see **Attachment B, Construction Drawings**). The project's scope of work includes installation of erosion controls, clearing, grubbing, grading, temporary placement of sandbags to redirect the stream during construction, relocation and installation of waterlines and electrical lines, construction and use of a temporary detour roadway and Acrow bridge, demolition of the existing bridge and construction of a new bridge, partial demolition and reconstruction of the abutments, removal of the existing center pier wall, excavation & construction of eight new drilled shafts outside the stream channel, maintenance dredging, and bank stabilization with shotcrete and dumped rip-rap. All excavated material (soils & dewatering effluent) will be placed in a temporary retention area for treatment and disposal. No excavated material will discharge to the stream.

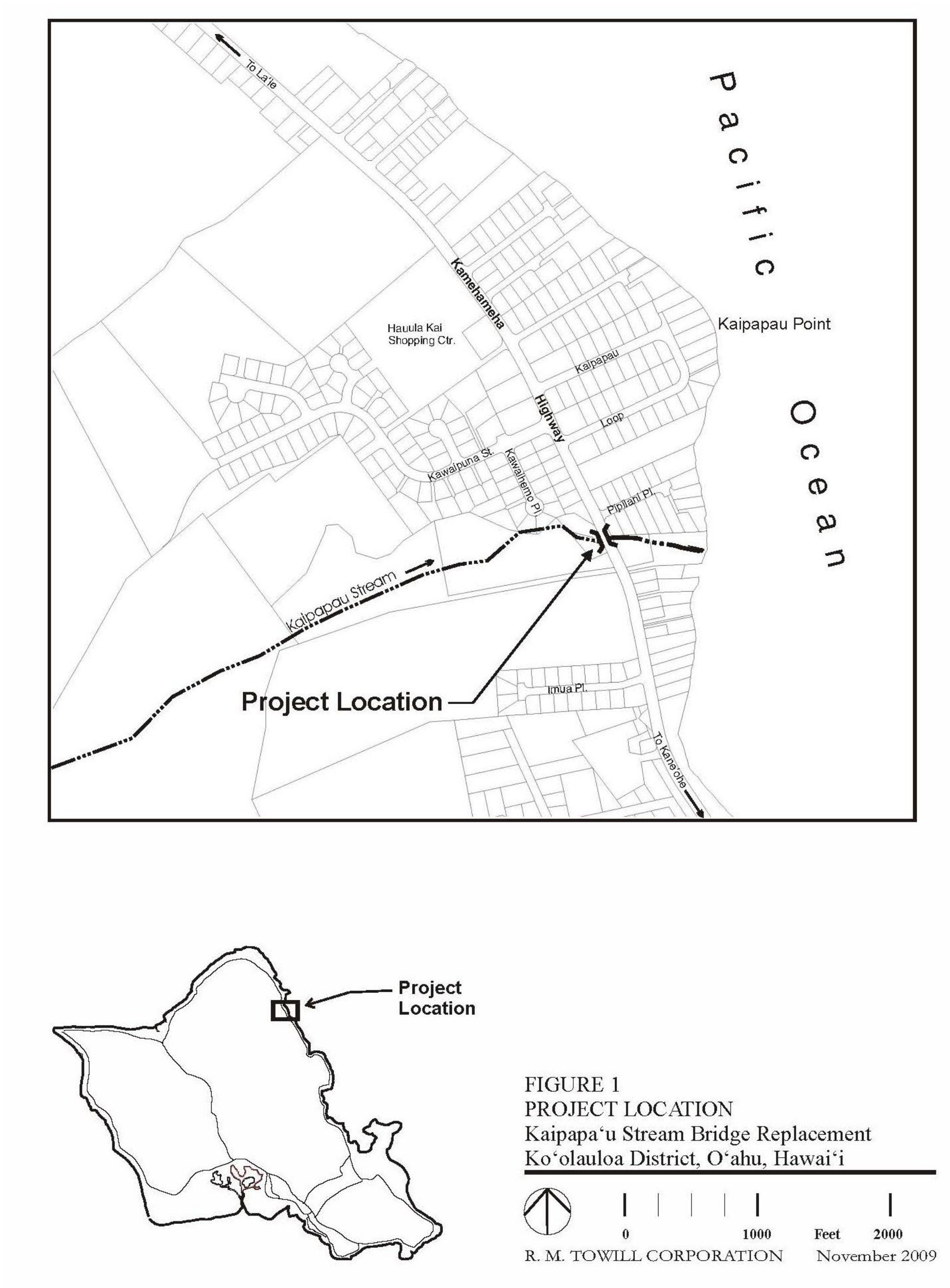


Figure 1. Project Location Map

The replacement of the Kaipapaʻu Stream Bridge and maintenance work will be completed through phased construction and demolition. Silt fences will be installed on down slope portions of the project site. A staging area, temporary dewatering basin, temporary concrete wash-out basin, and stabilized construction entrances will be prepared.

Sandbags will be used to divert normal-stream flow around the work area. The temporary placement of sandbags to redirect the stream during construction of the temporary detour road (sandbag diversion approximately 610 feet long) and new bridge (sandbag diversion approximately 600 feet long) and will be designed based on the Contractor's means and methods. It is assumed that 7 sandbags (1-foot-wide each) will be placed at the base (4 sandbags on the side of the channel closer to the work area, and 3 sandbags on the other side of the temporary channel). Placement of the temporary sandbag diversion will require approximately 25 cubic yards (CY) of temporary fill placed within the Mean Higher High Water (MHHW) and 5 CY of temporary fill placed within the Ordinary High Water Mark (OHWM).

A temporary construction entrance ramp will be constructed on the mauka and makai portions of the stream comprised of dumped rip-rap. There will be no interruption of stream flow. In-stream work will be completed during the low rainfall season (August to October), and during fair weather conditions.

Approximately 270 CY of maintenance dredging will be performed to remove accumulated sediment and debris from under and around the bridge partially within the MHHW. Approximately 5 CY is located within the MHHW of Kaipapaʻu Stream. The excavated spoils and demolition debris will not be discharged into the stream. Spoils will be dewatered in a detention basin and dried debris will be disposed of off-site at a County-approved landfill. Removed material will be contained in a temporary stockpile site with implemented BMPs to contain and prevent material from comingling with storm water runoff and entering into State waters. A solid waste disclosure form will be submitted to the Department of Health (DOH) Solid Waste Branch.

The temporary Acrow bridge will be 90 feet long by 42 feet wide, or approximately 3,780 square feet, and constructed with pre-cast concrete pier columns supporting the steel deck. The bridge will be comprised of two lanes and a pedestrian walkway on the makai side of the Kaipapaʻu Stream Bridge to mitigate traffic impacts during construction. The Acrow bridge will be constructed and installed in two 45-foot spans and supported by five pre-cast concrete piers, one of which is located within the MHHW. Placement of the one pier in the MHHW will require 1 CY of temporary fill below the MHHW. Temporary dumped rip-rap will be placed around the Acrow bridge pier within the MHHW and be sized approximately 54 feet long by 15 feet wide by 2 feet deep, or 810 square feet, with a volume of 50 CY. A 6-foot temporary layer of filter rock will be placed under the rip-rap with a volume of approximately 13 CY. Upon completion of the bridge replacement, the Acrow bridge and piers will be removed and disturbed areas restored to their pre-construction condition.

Demolition of the existing Kaipapaʻu Stream Bridge will include the removal of the existing concrete center pier wall, of which approximately 5 CY is located within the MHHW (26 feet long by 4 feet wide or approximately 104 square feet).

The new replacement bridge will be 110 feet long by 57 feet wide, or approximately 6,270 square feet, and include two 12-foot travel lanes plus two 8.5-foot shoulders, two 5-foot pedestrian walkways/bicycle lanes, reinforced guardrails, and drainage features. The new bridge will be constructed using prestressed concrete planks and cast-in-place bridge decks. The new right-of-way (ROW) will be 66 feet wide. The project will involve partial demolition and reconstruction of the abutments requiring excavation and construction of eight new 4-foot drilled shafts outside of the OHWM and MHHW. All work proposed for the reconstruction of the Kaipapaʻu Stream Bridge would be completed above and along the outer banks of the streams and no work is proposed within the stream. The new bridge would accommodate utilities currently attached to the existing bridge. No debris would be allowed to fall into or enter the stream.

The north bank makai of the bridge will be stabilized with dumped rip-rap outside of the MHHW. In addition to stabilization, the dumped rip-rap will provide construction access to the stream for mechanical equipment.

A section of the existing wall running along the northern bank mauka of the bridge collapsed during a major storm in 2008. Emergency repairs were conducted to create a wall of sandbags. The existing sandbag wall, located outside the OHWM, will be stabilized with the placement of basalt boulders at the toe of the sandbags. The existing sandbags will then be covered with shotcrete. Work for the stabilization of the wall will be performed above the OHWM. No debris would be allowed to fall into or enter the stream. See **Attachment A, Jurisdictional Boundary Maps**.

Portions of an existing 12-inch diameter waterline beneath Kaipapaʻu Stream will be repaired. The portions of the 12-inch waterline to be replaced are located outside the stream (see **Attachment B, Construction Drawings, C-20, C-28**) and will be repaired via open trench (approximately 85 linear feet). The existing 12-inch waterline under the stream will be temporarily removed from service during the repairs and then reconnected and placed back into service following completion of the 12-inch waterline work. During repairs a temporary 12-inch 125-foot-long or 125 square foot waterline will be placed on the existing pedestrian bridge.

The replacement of an existing 16-inch diameter will require the removal of the existing waterline, placement of a temporary waterline, and installation of the new 16-inch diameter waterline over the stream. The temporary 16-inch diameter 250-foot-long or 333 square foot waterline will be placed on the temporary detour bridge during construction. The new permanent 16-inch diameter 155 feet long or 207 square feet waterline will be installed over the stream within the new bridge 3.2-foot-wide concrete bridge encasement. Following the installation of the 16-inch permanent waterline the temporary waterline will be removed.

Above the MHHW and OHWM, the project will also include the reconstruction of the 6-foot-high concrete wall with wood fence panels on the northern side of the bridge, replacement of fencing, acquisition of two properties (Tax Map Keys (TMKs) 5-4-18: 3 and 5-4-11: 20), removal of an existing septic system and leaching field on TMK: 5-4-11: 20, and demolition of two buildings on TMK 5-4-18: 3 and one building on TMK 5-4-11: 20. Acquisition of property and demolition of structures is required for construction access and for the installation of waterlines to be supported on the outside edges of the new bridge.

In-water work would only be required for the minor maintenance dredging, removal of the existing bridge center pier wall, temporary placement of sandbags to divert the steam around the open work area, and temporary placement of one Acrow bridge pier within Kaipapa‘u Stream.

Project Phasing

The sequencing of construction activity is as follows:

- Install best management practices (BMPs)/erosion control measures (see **Attachment B, Construction Drawings, Sheet C-17**).
- Install temporary 12” water line and relocate existing 12” water line (see **Attachment B, Construction Drawings, Sheets C-20, C-28,** and **C-29**).
- Relocate electrical utilities.
- Construct trial and load test drilled shafts and perform load test.
- Construct detour roadway and temporary Acrow bridge.
- Demolish existing Kaipapa‘u Stream Bridge. Expose existing 16” water line jacket and concrete support system.
- Construct Phase 1 of new Kaipapa‘u Stream Bridge (see **Attachment B, Construction Drawings, Sheets S0.7, S0.7A, S0.7B**).
- Partially remove detour roadway and temporary bridge. Construct temporary pavement transitions, signing and pavement markings.
- Construct Phase 2 of new Kaipapa‘u Stream Bridge (see **Attachment B, Construction Drawings, Sheets S0.8, S0.8A, S0.8B**).
- Remove remainder of detour roadway and temporary bridge.
- Construct sandbags and shotcrete lining along north bank above stream, upstream of Kaipapa‘u Stream Bridge (see **Attachment B, Construction Drawings, Sheet C-18**).
- Construct dumped riprap along north and south bank above stream, downstream of Kaipapa‘u Stream Bridge (see **Attachment B, Construction Drawings, Sheets C-16** and **C-18**).
- Construct AC pavement (see **Attachment B, Construction Drawings, Sheet C-16**).
- Construct final signing and pavement markings.
- Remove temporary BMPs.

Equipment

Equipment may include, but is not limited to: bulldozers, excavators, drilling rig, loaders, grader, compaction rollers, backhoe, cranes, trucks delivering supplies, pneumatic hand-operated tools, dewatering pumps, asphaltic rock products and fill material, and related construction materials which will include the following:

- Concrete and shotcrete
- Asphaltic Concrete
- Precast structures
- Pipes
- Paints (enamel and latex)
- Cleaning solvents

- Rebar
- Wood
- Tar
- Masonry block
- Steel sheet piles
- Rocks/boulders
- Sandbags
- Soil fill material
- Acrow steel bridge deck

Construction Schedule

The estimated scheduled start time for construction is January 2021. The overall duration of the project is expected to be approximately three years. A detailed schedule of construction activity will be completed when a contractor is selected for the project.

Regulatory

The HDOT issued a Final Environmental Assessment (FEA) and Finding of No Significant Impact (FONSI) pursuant to its Chapter 343, Hawaii Revised Statutes, on February 23, 2007. A copy of the Final EA and FONSI can be found on the Office of Environmental Quality Control (OEQC) website at http://oeqc2.doh.hawaii.gov/EA_EIS_Library/2007-02-DD-OA-FEA-Kaipapau-Stream-Bridge-Replacement.pdf.

Senate Bill 1016 SD1 HD1 (expires June 30, 2022) exempts the HDOT from various State requirements for the subject project, including but not limited to:

- Section 401 Water Quality Certification (WQC)
- Stream Channel Alteration Permit
- Environmental Assessment

Other permits/consultations that have been obtained for the subject project but have no expiration date include:

- Special Management Permit
- Section 9, Rivers and Harbors Act (RHA) U. S. Coast Guard Clearance
- Section 106, National Historic Preservation Act, Consultation
- Section 7, Endangered Species Act, Consultation
- Section 4(f) Department of Transportation Act, Consultation

HDOT requests help in identifying if a new Coastal Zone Management (CZM) Federal Consistency Concurrence (prior obtained November 10, 2008) is required for the subject project. Please see **Attachment E** for copies of prior permits/consultations completed for the project.

4c. Direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure:

Physical Environment

Lands surrounding the Kaipapaʻu Stream Bridge are single family residential and commercial in character and are privately owned. Several blocks to the north of the site is the Hauʻula Shopping Center, a strip mall with retail space and a parking lot. Parcels immediately surrounding the bridge are single family residential. There are no known uses along this section of Kaipapaʻu Stream.

Kaipapaʻu Stream originates in the northern section of the Koʻolau Mountain range and descends from an elevation of around 2,600 ft (792 m), flows under Kamehameha Highway and discharges at the shoreline between Kaipapaʻu Point and Hauʻula Beach Park. In the vicinity of Kamehameha Highway, Kaipapaʻu Stream is channelized and the banks are hardened in most places. Upstream from the bridge, the southern (Kāneʻohe-side) bank of the stream is hardened and yards of neighboring houses abut the wall. The northern (Kahuku-side) upstream bank is an eroding soil bank where a concrete wall collapsed in late 2008. Further upstream, the boulder-bottom stream narrows as it climbs up into the valley. Immediately upstream from the bridge, the stream widens as it flows nearly parallel to the bridge. The stream currently flows under the southern (Kāneʻohe-side) side of the bridge because the northern underpass is clogged with soil, rocks and debris. Downstream of the bridge, the stream becomes shallow and widens as it flows to the ocean. This downstream section of the stream has been channelized as it flows between houses with large yards and sections of the banks that are hardened.

Just upstream of the bridge, the stream has been shown to be tidally influenced to 1.50' MSL. Upstream of that, the OHWM of the stream runs along the northern bank where the proposed reconstruction of the toe of the sandbag wall is proposed. See **Attachment A, Jurisdictional Boundary Maps** for documentation of the OHWM. Kaipapaʻu Stream is classified as an interrupted perennial stream. The lower reaches can have intermittent flows during the dry season. Stream flow at the project site occurs along the southern bank of the stream/bridge as there are accumulated sediment/soils, rocks and debris on the northern portion of the stream channel directly under the bridge.

The soils at the site fall under four soil series: Jaucas, Kawaihapai, Lolekaa, and Waikane. No significant impacts to soils are anticipated as a result of this project. Soil erosion will be minimized through the installation of erosion and sediment control measures, and construction BMPs proposed for this project.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) identifies the Kaipapaʻu Stream Bridge project site as lying within Zone AE areas within the 100-year flood inundation zone in which base flood elevations are between 10 and 14 feet.

The caprock aquifer beneath the area is composed of coral, sand, silt, lithified dunes, and clay. Sedimentary materials such as clay strata and limestone within the caprock interfere with the movement of groundwater. Groundwater within the cap rock moves toward the ocean, however, local variations may affect the flow direction. This underlying groundwater is not considered a drinking water source. Only clean uncontaminated fill material will be used for the project. The majority of the fill material will consist of concrete and rip-rap. No permanent stream channelization or discharge of dredged or fill material into WOUS is proposed. No stream bank stabilization within the MHHW or OHWM are proposed.

The present air quality in the vicinity of the project is good, due to the prevailing northeasterly trade winds and absence of "heavy" industries. Short-term impacts to air quality include fugitive dust during the demolition and construction, and exhaust from equipment and vehicles. The project is not anticipated to adversely affect long term air quality.

At a distance of 15 feet from the edge-of-pavement of Kamehameha Highway, the existing noise levels range from approximately 70dBA during the daytime hours to approximately 60 dBA at night. Short term effects are limited to noise from construction activity occurring on the project site. After construction is completed, it is expected that noise levels will return to pre-construction conditions.

No wetlands or critical habitat are located within or near the project site. The proposed project is not expected to result in the loss of wetlands, other special aquatic sites, and other waters.

Potential Effects on Physical Environment

No adverse effects to the physical environment are expected. Proposed bridge and maintenance dredging will be designed and constructed to ensure that flows within these streams are unimpeded during normal flow and flood conditions.

Biological Environment

Flora

A Biological Resources Study was performed on March 3, 2004 by Char & Associates. The vegetation at the proposed project site is dominated by introduced species such as Elephant Grass and Guinea grass. See the **Attachment G, Final Environmental Assessment, Appendix B.** No species surveyed was listed as threatened or endangered.

Within the approach area along the right-of-way, there are asphalt-covered walkways and grassy mowed lawns. The grassy strips along the highway are primarily Bermuda grass or manienie (*Cynodon dactylon*) with smaller mats of wiregrass (*Eleusine indica*) and Hilo grass (*Paspalum conjugatum*). Landscaping on the residential lots fronting the highway consists of an assortment of ornamental species which include spider lily (*Pancratium maritimum*), beach naupaka or naupaka kahakai (*Scaevola sericea*), false kamani (*Terminalia catappa*), croton (Codiaeum variegatum), Hibiscus cultivars, coconut trees (*Cocos nucifera*), etc.

Upstream (mauka side) of the bridge, the stream banks are lined with dense elephant or Napier grass (*Pennisetum purpureum*), 7 to 8 feet tall. On the top banks, it is largely Guinea grass with a few scattered koa haole (*Leucaena leucocephala*) shrubs. On the downstream (*makai*) side of the bridge, the vegetation is open with patches of elephant grass and a few tall false kamani trees border the house lots. The stream bottom is rocky in this area.

A few weedy patches are interspersed throughout the site and include mostly annual, herbaceous species such as white-flowered beggar's tick (*Bidens alba*), sensitive plant or puahilahila (*Mimosa pudica*), nutgrass (*Cyperus rotundus*), field bindweed (*Ipomoea alba*), Chinese violet (*Asystasia gangetica*), Guinea grass (*Panicum maximum*), broad-leaved plantain (*Plantago major*), and false mallow (*Malvastrum coromandelianum*).

The U. S. Department of the Interior – Fish and Wildlife Service (USFWS) and State Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW), were consulted for the proposed project, who confirmed that no federally listed or proposed threatened or endangered species or candidate species, or proposed or designated critical habitats occur within the project area (**Attachment E**):

Potential Effects to Flora

No adverse effects to flora are expected. No threatened or endangered plant species, or critical habitat were observed in the vicinity of the project.

Fauna

A Water Quality and Biological Reconnaissance Survey was performed for the by AECOS, Inc. on May 14, 2004. See the **Attachment G, Final Environmental Assessment, Appendix D.** No species surveyed was listed as threatened or endangered.

See the table below for a list of aquatic biota surveyed by AECOS, Inc. on May 14, 2004 and published on October 1, 2004.

Scientific Name and Reference	Local Name	Status	Observed?	Abundance
INVERTEBRATES				
MOLLUSCA, GASTROPODA	(mollusks)			
NERITIDAE				
Neritina vespertina Sowerby	*hapawai* (adults & eggs)	Endemic	Observed	U
ARTHROPODA,CRUSTACEA	(crustaceans)			
PALIEMONIDAE				
Macrobranchium grandimanus (Randall)	*‘opae ‘oeha ‘a*	Endemic	Observed	U
VERTEBRATES				
VERTEBRATA, PISCES	(fishes)			
CICHLIDAE				
Sarotherodon sp.	tilapia	Naturalized	Observed	C
GOBIIDAE				
Awaous guamensis (Valenciennes)	*‘o ‘opu nakea*	Indigenous	Observed	O
Stenogobius hawaiiensis Watson	*‘o ‘opu naniha*	Endemic	Observed	C
Sicypoterus stimpsoni (Gill)	*‘o ‘opu nopili*	Endemic	Observed	R
KUHLIIDAE				
Kuhlia sandvicensis (Steindachner)	*aholehole*	Endemic	Observed	C
MUGILIDAE				
Mugil cephalus L.	*‘ama ‘ama*	Indigenous	Observed	C
POECILIIDAE				
Gambusia affinis (Baird & Girard)	mosquitofish	Naturalized	Observed	U
Poecilia mexicana (Steindachner)	Mexican molly	Naturalized	Observed	O

Abundance Categories: R – Rare – only one or two individuals seen. 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.

The stream will not be interrupted during construction, only diverted around the work areas, to permit the passage of native animals potentially found at the site including the ‘opae ‘oeha ‘a, ‘o‘opu nopili, and other gobies.

No protected or endangered species have been observed on or in proximity to the site. If a protected or endangered species is spotted, construction activity will cease until the animal has departed. Consultation with the National Oceanic and Atmospheric Administration

(NOAA) – National Marine Fisheries Services (NMFS) and USFWS was undertaken during the Section 4(f) and Section 7 federal consultation processes. Consultation determined that while the mouth of the Kaipapaʻu Stream is known as a haul-out for Hawaiian Monk Seals (*Monachus schauinslandi*), it is unlikely that marine mammals will travel 300 feet upstream to the project site. The Hawaiian monk seal was the only animal species identified by either agency. For a copy of the consultation record see **Attachment E**.

Potential Effects to Fauna

No adverse effects to fauna are expected. The proposed project will be constructed during daylight hours with no night work planned. Additionally, no permanent lighting or vertical man-made structures are proposed; therefore, no impacts to seabirds are expected.

No adverse impacts to Essential Fish Habitat (EFH) and management unit species (MUS) are expected. The project will follow NMFS EFH conservation recommendations identified in **Section 4d** below.

Based on information obtained from the USFWS and NOAA and information contained in the biological assessment conducted for the project, no designated critical habitat is located within the vicinity of the project area. While it is unlikely that the species would travel up the stream to the project site the project will follow *NMFS Best Management Practices (BMP) for General In-Water Work Including Boat and Driver Operations (October 2018)* (**Attachment D**). No other federally listed or proposed threatened or endangered species or candidate species occur within the project area (**Attachment E**).

Chemical Environment

Analyses of the water quality data collected from Kaipapaʻu Stream on August 28, 2006 show normal temperature and pH values, with relatively low percent saturation of dissolved oxygen. Phosphorous and ammonia, nitrate and nitrite concentrations were high. The latter concentrations may account for a majority of total nitrogen content observed at the site. Additional sampling performed in April and June of 2012 yielded similar pH values and slightly higher percent saturation of dissolved oxygen. See table below.

Monitoring Station	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH (ppt)	Salinity
Station #1	No water	-	-	-	-
Station #2	22.7	5.25	61	7.02	<1
Station #3	22.6	5.00	58	7.02	<1
Station #4	23.4	7.34	86	6.84	<1

Monitoring Station	Turbidity (NTU)	Total Susp. Solids (mg/L)	Nitrate+Nitrite (ug/L)	Total Nitrogen (ug/L)
Station #1	No water	-	-	-
Station #2	1.41	1.1	802	1110
Station #3	1.49	1.5	825	1130
Station #4	2.10	2.2	745	1170

Potential Effects on Chemical Environment

Potential for pollutant discharge into Kaipapa'u Stream during construction would primarily result from release of silt and suspended sediments during excavation and grading activities or during extreme storm conditions. Dewatering activities are anticipated during the installation of drilled shafts within the stream channel. Additionally, debris dropped during demolition of the existing bridge is a potential source of discharge pollution. All activities that may have a potential to affect water quality will be handled through the use of BMPs and in accordance with County, State and Federal rules and regulations.

4d. Description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity:

Best Management Practices (BMPs) Plan

Provided below are the proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity. Specific measures are included for listed and protected species, critical habitats, and waters of the United States that occur within the vicinity of the project area. Additionally, HDOT's pre-approved measures for construction BMPs) and Standard Operating Procedures (SOPs) (**Attachment D**) are provided for use by the Contractor to implement. Selection of appropriate BMPs by the Contractor will be based on the most effective means and methods to ensure the protection of the environment and waters of the United States to the maximum extent practicable at the project site.

Consultation determined that while the mouth of the Kaipapaʻu Stream is known as a haul-out for Hawaiian Monk Seals (*Monachus schauinslandi*), it is unlikely that marine mammals will travel 300 feet upstream to the project site. The project will follow *NMFS Best Management Practices (BMP) for General In-Water Work Including Boat and Driver Operations (October 2018)* (**Attachment D**) and comply the with Pacific Standard Local Operating Procedure for Endangered Species (Pac-SLOPES) general conditions, special conditions, and activity-specific BMPs to avoid effects to threatened or endangered marine species.

No loss of aquatic habitat or waters of the United States would be required for the proposed action and no long-term impacts are expected. While no EFH has been designated within the project area, the project will implement the NMFS EFH conservation recommendations provided below (pursuant to sections 305(b)(2)(B) of the Magnuson-Stevens Act):

- Conservation Recommendation 1: The contractor(s) should conduct work during dry season when possible; stop work during storms or heavy rains.
- Conservation Recommendation 2: The contractor(s) should inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there is no contaminant (oil, fuel, etc.) leaks.
- Conservation Recommendation 3: The contractor(s) should ensure that all equipment found to be leaking contaminants is removed from service until repaired.
- Conservation Recommendation 4: The contractor(s) should ensure that all fueling and repairs to equipment is done in a location that prevents the introduction of contaminants to EFH.
- Conservation Recommendation 5. The contractor(s) should prevent the discharge of chemicals and other fluids dissimilar from seawater into the water column.
- Conservation Recommendation 6: The contractor(s) should prevent trash and debris from entering the marine environment through the use of nets or barriers.
- Conservation Recommendation 7: The contractor(s) should use materials that are nontoxic to aquatic organisms, such as untreated wood, concrete, or steel (avoid pressure-treated lumber).

- Conservation Recommendation 8: The contractor(s) should ensure that all construction equipment used for in-water work does not pose a risk of introducing new invasive species and will not increase abundance of those invasive species present at the project location.
- Conservation Recommendation 9: The contractor(s) should ensure that appropriate BMPs are developed and implemented to minimize erosion and stormwater runoff during all proposed project activities (e.g., bridge replacement and maintenance dredging) to minimize adverse effects from turbidity and sedimentation.

No wetlands are located within the project area. No impacts to listed species, EFH, MUS, waters of the United States, wetlands, or critical habitat are expected.

The project will adhere to the U.S. Army Corps of Engineers General and Regional Nationwide Permit Conditions, and the State of Hawaii's DOH National Pollution Discharge Elimination System (NPDES) guidelines, and a Site-Specific Construction Storm Water BMP Plan.

General Construction Best Management Practices (BMPs)

The USACE and DOH-CWB provisionally approved the HDOT and Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD) to use the Streamlined 404/Water Quality Certification (WQC) process and Provisional Approval of SOPs for Streamlined WQC Process (WQC SOP File No. 20160930.DOTHWYS dated September 28, 2016). This Streamlined application process, hereinafter called Streamlined 404/WQC process, attempts to streamline the required submittals to the USACE and DOH-CWB by using the following tools:

1. An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawaiʻi, by the Federal Highway Administration and Hawaiʻi Department of Transportation Practitioners Guide (Practitioners Guide) (**Attachment E**)

2. Storm Water Pollution Prevention Plan and In-Water Pollution Prevention Plan (SWPPP/IWPPP)

The Practitioners Guide details DOH-CWB pre-approved SOPs for use when submitting a WQC application. The SOPs include BMPs/Clear Water Diversions. The Contractor will implement their Means and Methods (including installation of BMPs/Clear Water Diversions) following the pre-approved BMP practices in the Practitioners Guide. Projects covered under the pre-approved SOPs do not require water quality monitoring; BMP submittals; Applicable Monitoring and Assessment Plan (AMAP) submittals; antidegradation analysis submittals; public notice; or public hearing.

The SWPPP/IWPPP is similar to the SWPPP used in NPDES Form C permits. It is a site-specific, written document that, among other things:

1. Identifies potential sources of storm water pollution at the construction site;

2. Describes storm water control measures to reduce or eliminate pollutants in storm water discharges from the construction site; and

3. Identifies procedures the permittee shall implement to comply with the terms and conditions of the Section 404 NWP and the WQC.

Potential exists for short-term impacts from construction activities on the water quality of the stream environment. Potential for pollutants of concern will be limited to the following:

1. Dredged spoils
2. Imported soils
3. Soil erosion from the disturbed areas
4. Petroleum products
5. Leaking fluids from vehicles and construction machinery
6. Vehicle wash water
7. Dewatering effluent
8. Hydrotesting effluent
9. Concrete
10. Demolition Debris

All pollution prevention measures (silt fences, basins, etc.) will be constructed and/or implemented prior to the start of construction activities. These measures will be maintained throughout the entire construction period.

Dredged material (i.e. accumulated soil, rocks and debris) will be removed incrementally during the construction period. Erosion and sediment control measures (i.e. sandbags, silt fences, etc.) will be installed prior to any ground disturbance. Removed material will be contained in a temporary stockpile site with implemented BMPs to contain and prevent material from comingling with storm water runoff and entering into State waters. The dredged material will be disposed of at a County-approved waste facility.

Materials and supplies, including imported fill, will be brought onto the project site on an "as needed" basis. Fill materials will be comprised of excess excavated soils and/or clean imported fill. All materials used will be in accordance with specifications for construction of such facilities by the State and County. No materials containing contaminated soils or other hazardous wastes will be permitted for use. Any material that is stored for longer periods will be covered with PVC sheeting or similar material to prevent contact with storm water runoff at the site and any excess material disposed of at a County-approved facility.

Earthwork activities shall be sequenced to minimize the exposure time of exposed surface areas. Soil erosion will be minimized through the installation of erosion and sediment control measures in compliance with State and County regulations. Stabilized construction access will be provided and adjacent roadways/paved surfaces will be regularly cleaned to remove any excess dirt, mud and/or debris resulting from construction activities.

In-stream activities will only be done when fair weather conditions are expected and following the temporary diversion of the stream away from the active work area. Stream diversion and work area isolation will be accomplished using sandbags wrapped with an impervious liner. Sandbag fill material will be clean, imported sand. As much as possible the sand will be of similar color and grain size to the existing sand downstream of the site. Stream flow shall be maintained throughout the entire duration of the project.

Measures will be taken to prevent loose soil and debris from falling into the stream. Following removal of the temporary structures, the site will be immediately stabilized and appropriate erosion control measures implemented to minimize/eliminate erosion impacts.

All erosion control measures shall be checked and repaired as necessary, e.g., weekly, in dry periods and within 24 hours after any rainfall event of 0.5 inches or greater within a 24-hour period. During prolonged rainfall, daily checking will be required. The owner shall maintain records of checks and repairs to structural controls. Should large storm events occur, all equipment will be removed from within the stream channel and the site secured to prevent adverse impacts from flood waters.

Storage of petroleum-based products shall be prohibited on-site, unless they are stored in tightly-sealed containers with proper labeling and under a roof.

All materials while stored on-site shall be kept in a neat, orderly manner in their appropriate containers and as required, under a roof or other enclosure. Clean up material for petroleum, oils, and lubricant-associated products will be retained on-site in the event of accidental spills. The clean-up materials will be either stored in a covered shelter or on construction vehicles. Lidded containers will be used to contain spilled material to prevent mixing with storm water. Contained spill material will be disposed of at a County-approved facility.

Leaking fluids from vehicles and construction machinery will be handled as follows:

> Leaking or poorly-maintained construction equipment and machinery will not be permitted on site. Any equipment or machinery found to be faulty will be immediately repaired or replaced.
>
> Refueling and maintenance of construction equipment and machinery will be at designated areas with measures to contain accidental spills.

Vehicle wash water will be handled as follows:

> Wash water will not be permitted to be discharged into State waters.
>
> Vehicle washing may only be permitted in designated areas with control measures designed to contain wash water and capture pollutants (sediments). Wash water will be allowed to infiltrate/evaporate. Sediments resulting from vehicle washing will be disposed of in compliance with State and County regulations governing disposal of construction wastes.

Dewatering effluent will be in accordance with the NPDES NOI Form G dewatering permit that will be filed with DOH-CWB for this project.

Treated hydrotesting water will be used on site for irrigation and dust control and discharged into State waters only if necessary. The discharge of hydrotesting effluent into State waters will be done in accordance with the NPDES NOI Form F permit that will be filed for this project.

Water for dust control will only be sprayed onto active work areas and only in amounts sufficient to dampen the soil without causing runoff.

In order to prevent or reduce the discharge of pollutants to storm water from concrete waste, the following BMPs will be implemented:

Accidentally spilled concrete material will be cleaned up immediately.

Mixing of excess concrete will be avoided.

Disposed concrete will be contained in a lidded container to prevent mixing with storm water in the event of rainfall.

Wash-out of concrete trucks shall be done at a specified location with proper measures to contain effluent.

To prevent demolition debris from entering the stream, netting material will be suspended under the bridge structure to catch falling debris resulting from demolition activities. Plastic sheets or similar material will be laid on top of the netting material to capture smaller debris. Demolition activities will not be allowed during rainfall events or during times when the stream is experiencing high flow.

Additional measures may be implemented once the project contractor has been selected and allowed to assess site conditions. Any proposed revisions to the SWPPP/IWPPP resulting in increased effectiveness of erosion control measures will be submitted to DOH-CWB for review and approval prior to the start of construction activities.

Following construction, all areas disturbed as a result of the construction activities will be restored and/or stabilized (landscaped, grassed and/or paved). Additionally, all equipment no longer necessary to the site will be removed. Construction debris and refuse will be disposed of at a County-approved facility by the contractor.

8. Historic Properties

8a. For non-Federal permittees: Is there a known historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places within or near the project area?

There are no known archaeological sites within the proposed bridge replacement project site. The Kaipapa'u Stream Bridge, constructed in 1932, has a National Bridge Inventory (#0033000830302099) rating of 37. It is not listed on the State of Hawai'i Draft Historic Bridge Inventory and Evaluation (May 1996). The *1983 Historic Bridge Inventory, Island of O'ahu* identified the Kaipapa'u Stream Bridge as having poor aesthetics and poor integrity. However, the inventory identified the bridge as significant because it served as a transportation linkage to Windward communities and its association with one of Honolulu's prominent builders, L. L. McCandless. Burials have been encountered immediately to the north and south of the bridge site (i.e., State Site # 50-80-06-4795 (approximately 350 ft. south of the bridge) and State Site# 50-80-06-4796 (approximately 120 ft. north of the bridge) (**Figure 2**). The burial sites are located outside of the project's Area of Potential Effect.

A Section 106 Consultation was undertaken for the proposed project. See **Attachment E** and **Attachment G, Final Environmental Assessment, Appendix E**. A list of individuals and organizations contacted during the Section 106 process is also included in **Attachment G, Final Environmental Assessment, Appendix E**.

The State Historic Preservation Office concluded that the proposed project will have no adverse effect with the condition that the bridge is photographed before demolition and that archaeological monitoring be conducted, in association with planned ground disturbance within the project area.

Photo documentation of the Kaipapa'u Stream Bridge acceptable to the SHPD will be performed prior to the start of construction in accordance with the requirements of the Historic American Engineering Record (HAER).

The Archaeological Monitoring Plan for the Kaipapa'u Stream Bridge Replacement Project was received and accepted by SHPD on January 22, 2010. Archaeological monitoring of the bridge replacement work shall be conducted during ground disturbing activities in accordance with the SHPD accepted Archaeological Monitoring Plan. The Archaeological Monitoring Plan was inclusive of the area makai of the bridge where the detour road is to be constructed. A Cultural Impact Assessment was also performed to further mitigate the removal of the bridge. In the unlikely event that archaeologically significant remains are encountered, work will cease in the immediate area and the DLNR, SHPD would be notified at (808) 692-8015 to determine significance and treatment of any findings.

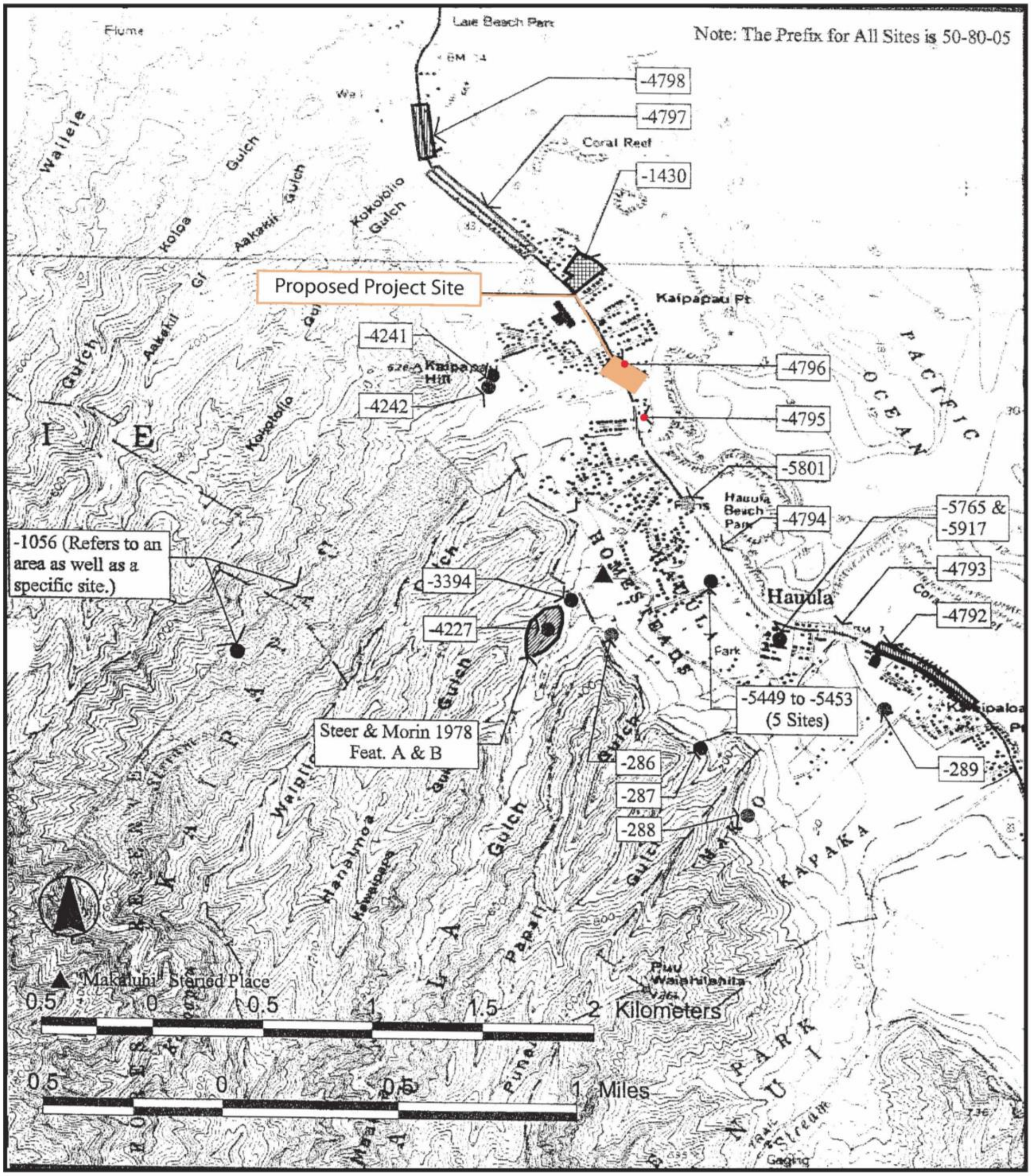


Figure 2. Historic Sites

Attachments

Attachment A – Jurisdictional Boundary Maps

Attachment B – Construction Drawings

Attachment C – An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawai‘i, by the Federal Highway Administration and Hawai‘i Department of Transportation Practitioners Guide

Attachment D – NMFS Best Management Practices (BMP) for General In-Water Work Including Boat and Driver Operations (October 2018)

Attachment E – Consultation and Environmental Entitlements Obtained Previously

- **Attachment 1** **Senate Bill 1016 SD1 HD1 – Exemption**
- **Attachment 2** **CZM Federal Consistency Review Determination (November 10, 2008)**
- **Attachment 3** **Stream Channel Alteration Permit Approval (February 18, 2009, provided for reference – no longer required per SB 3010)**
- **Attachment 4** **Section 4(f) Coastal Zone Management**
- **Attachment 5** **Endangered Species Act Section 7**
- **Attachment 6** **Rivers and Harbors Act Section 9**
- **Attachment 7** **National Historic Preservation Act Section 106**
- **Attachment 8** **Special Management Area Approval (Resolution 278-CD1)**
- **Attachment 9** **Categorical Exclusion Approval**

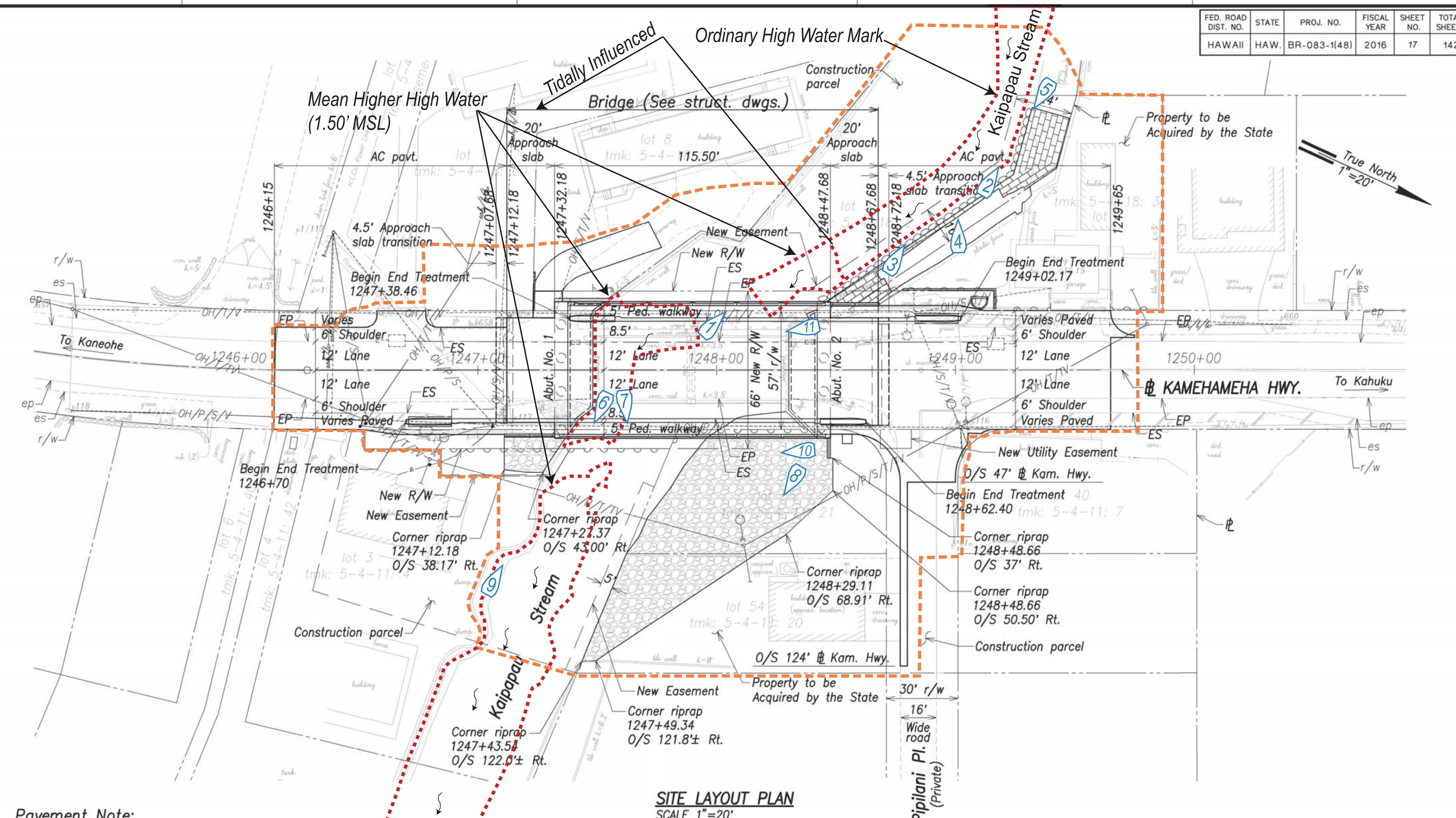
Attachment F – USACE Revised Nationwide Permit Verification for Kaipapa‘u Stream Bridge Replacement Project – POH-2005-00342

Attachment G – Final Environmental Assessment (see enclosed CD)

- **Appendix A** **Traditional Cultural Practices Assessment**
- **Appendix B** **Botanical Resources Study**
- **Appendix C** **Noise Impact Assessment**
- **Appendix D** **Water Quality and Biological Reconnaissance Surveys of Lower Kaipapa‘u Stream**
- **Appendix E** **SHPD Correspondence**
- **Appendix F** **Public Consultation**

Attachment A
Jurisdictional Boundary Maps

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	17	142



SITE LAYOUT PLAN
SCALE 1"=20'

Pavement Note:

Contractor shall submit a pavement phasing plan and schedule for the AC pavement work to the State Engineer for review and approval. Contractor shall be responsible for providing temporary traffic controls, temporary pavement transitions, notifying affected residences of the work schedule and providing safe temporary access at all times to driveways and streets. Continuous two way traffic shall be maintained at all times. Work shall be considered incidental to various items of work.

Legend:

- Dumped Riprap
- Project Boundary
- Army Corps Jurisdiction
- Photo Key

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SITE LAYOUT PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted   Date: April 2015

SHEET No. C-16 OF SHEETS

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4/30/16
SIGNATURE   LIC. EXPIRATION
R. M. TOWILL CORPORATION

ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | NOTE BOOK | No. | DATE

RMTC JOB NO.: 1-19548-0E

Kaipapa'u Stream Bridge Replacement
Site Photos with Designated OHWM and MHHW

1. Kaipapa'u Stream – Upstream View

MHHW OHWM

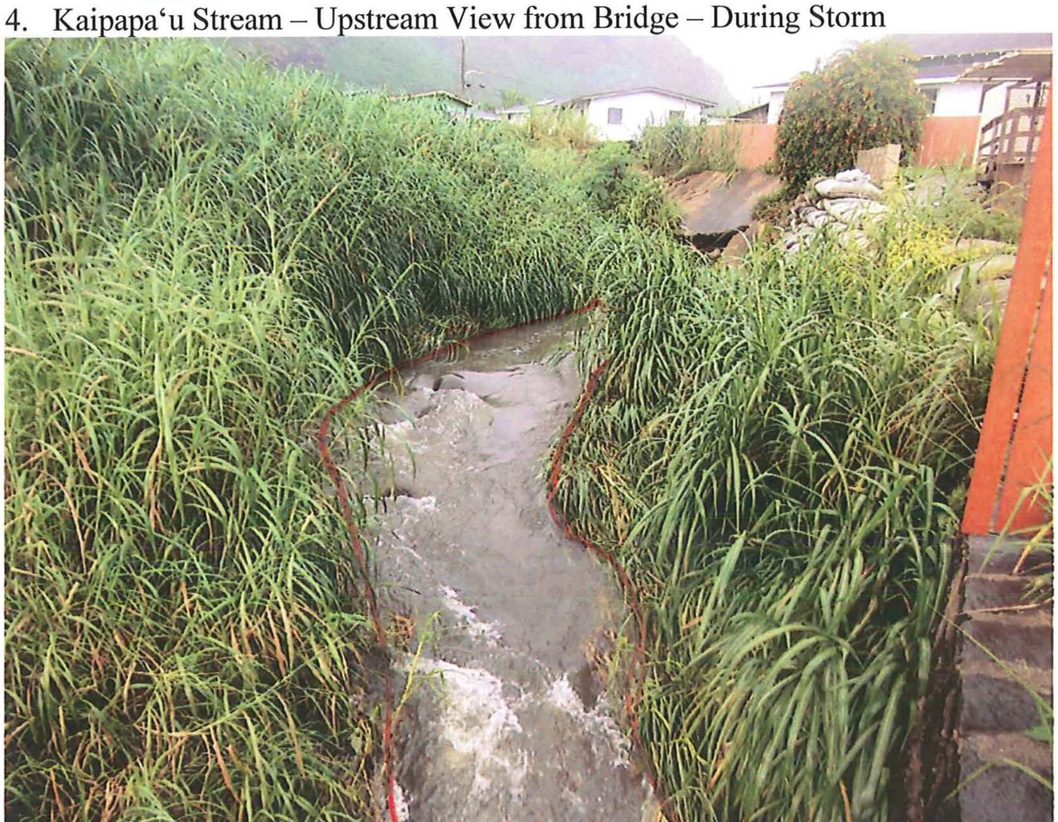
2. Kaipapa'u Stream Wall Repair – Close-up

OHWM

3. Kaipapa'u Stream – Upstream from Project Site

← OHWM →

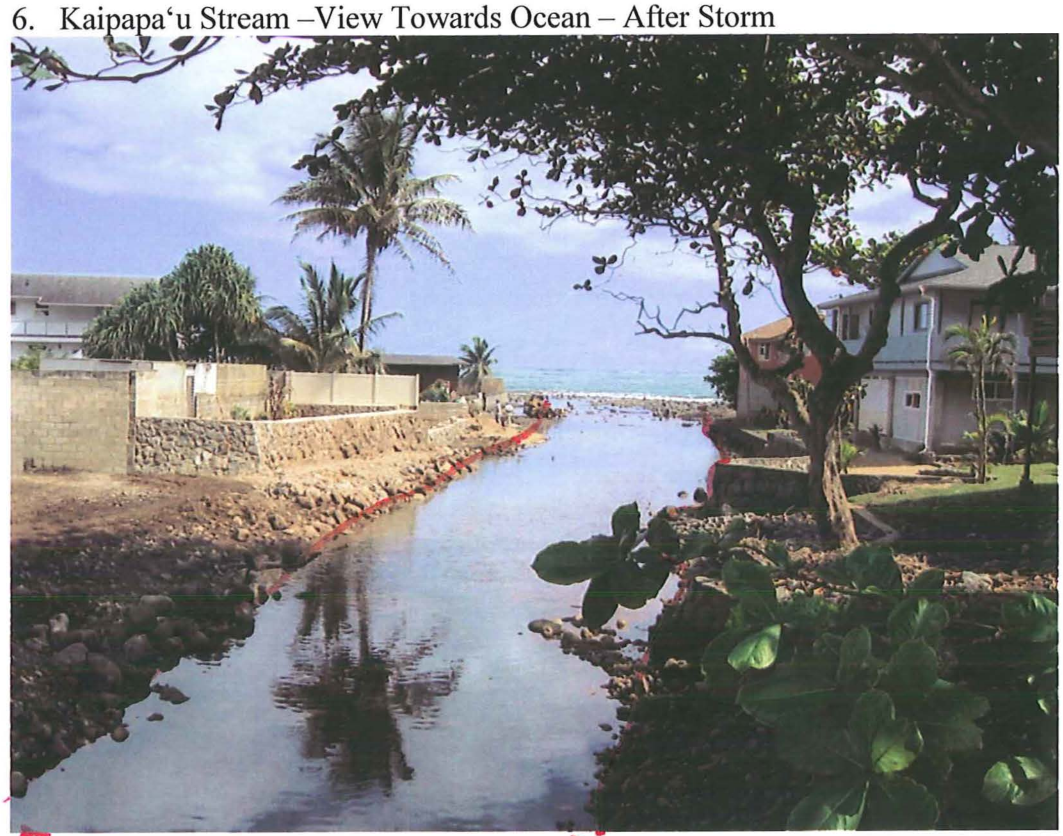
4. Kaipapa'u Stream – Upstream View from Bridge – During Storm



← OHWM →

5. Kaipapa‘u Stream Bridge – Upstream Side

6. Kaipapa‘u Stream –View Towards Ocean – After Storm



MHHW

7. Kahuku Makai Bank – Downstream Side

MHHW

8. From Kahuku Makai Bank – View to Ocean – During Storm

MHHW

9. Kaipapa‘u Stream Bridge – Downstream Side – After Storm

10. Kaipapa‘u Stream Bridge – Downstream Side – During Storm

11. Kaipapaʻu Stream Bridge – Looking to Kāneʻohe – After Storm

OHWM

MHHW

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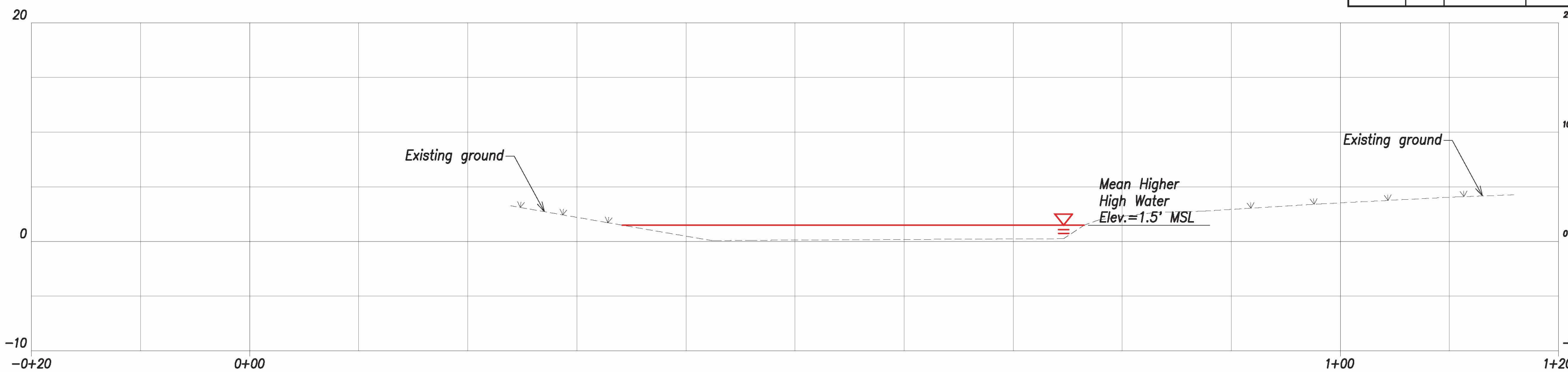

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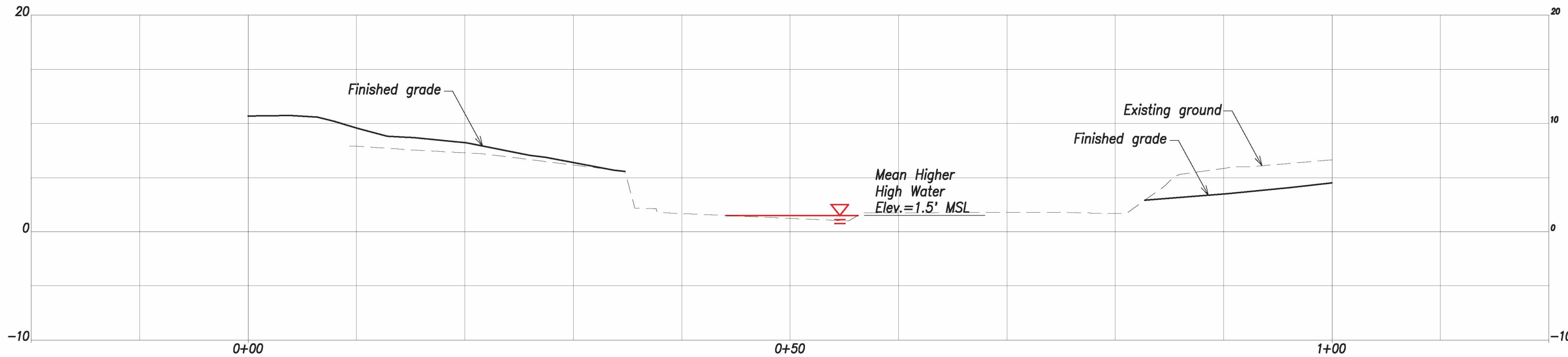

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Scale in Feet

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXHIBIT 2
SECTIONS – 1
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Project No. BR-083-1(48)

Scale: AS NOTED Date: DECEMBER 2013

SHEET No. 2 OF 4 SHEETS

ORIGINAL PLAN
NOTE BOOK
No.
SURVEY PLOTTED BY
DRAWN BY RSY
TRACED BY
DESIGNED BY WC
QUANTITIES BY
CHECKED BY
DATE

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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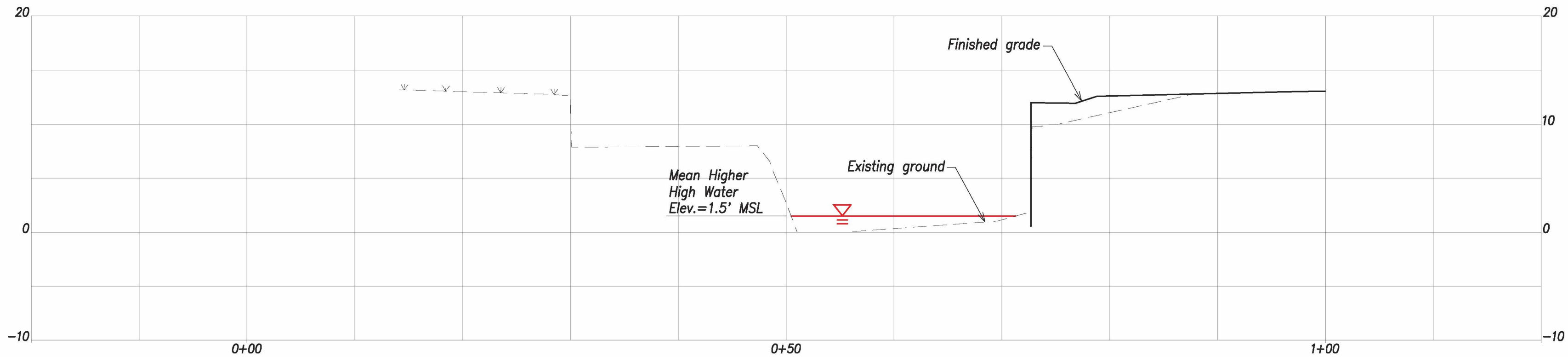

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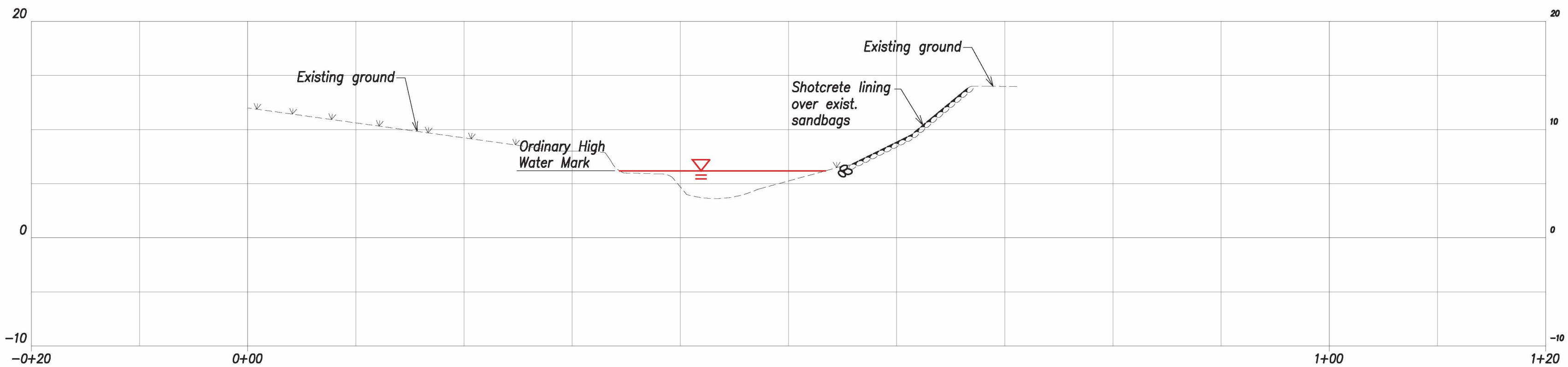

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXHIBIT 3
SECTIONS – 2
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Project No. BR-083-1(48)

Scale: AS NOTED Date: DECEMBER 2013

SHEET No. 3 OF 4 SHEETS

RMTC JOB NO. : 1-19548-0E

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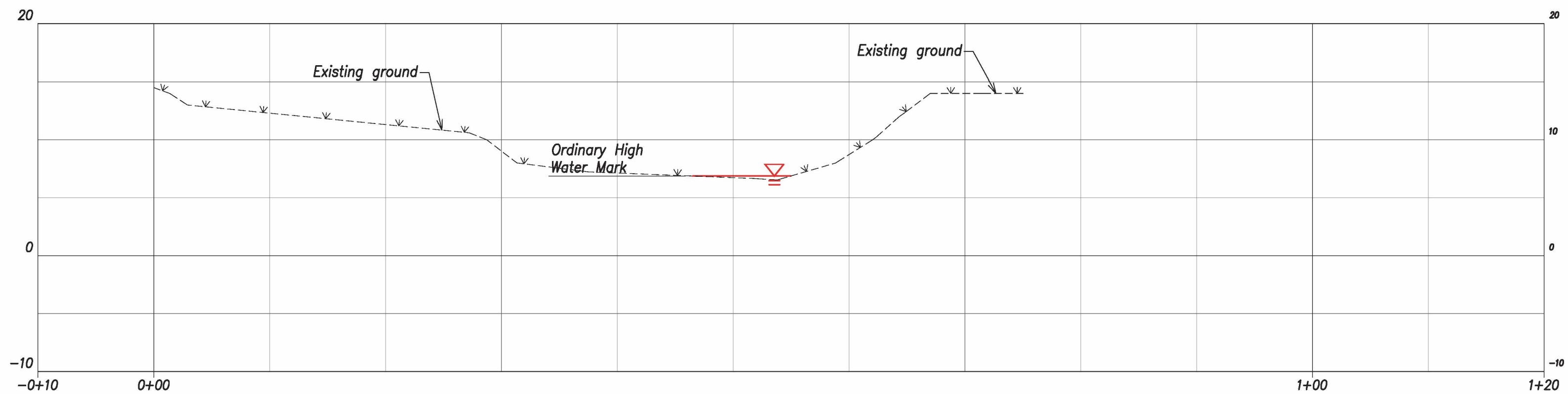

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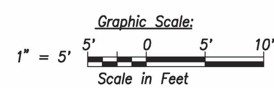

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXHIBIT 4
SECTIONS – 3
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Project No. BR-083-1(48)

Scale: AS NOTED Date: DECEMBER 2013

SHEET No. 4 OF 4 SHEETS

RMTC JOB NO. : 1-19548-0E

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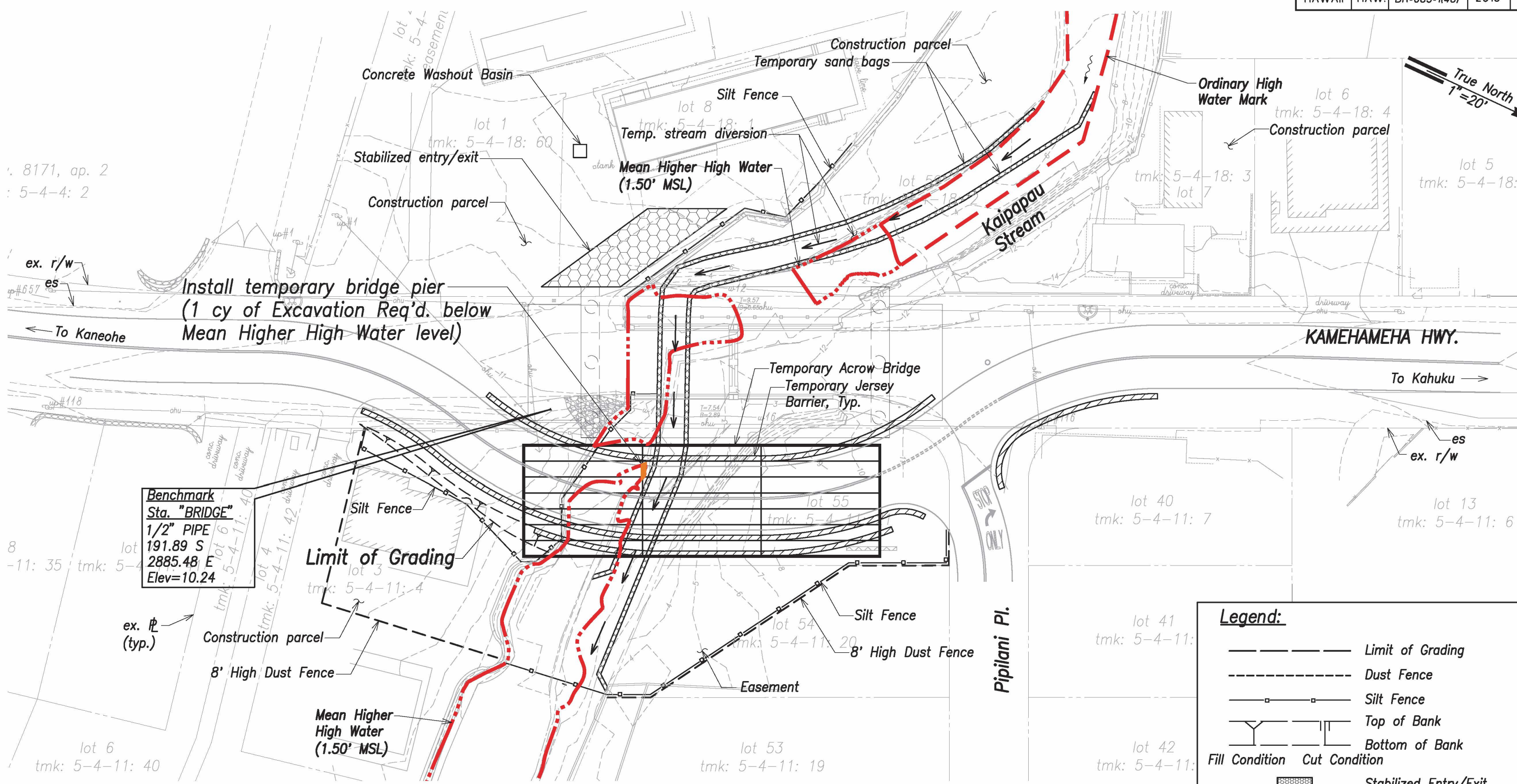
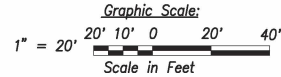


TEMPORARY DETOUR ROADWAY PLAN
Scale: 1"=20'

Legend:

— — — —	Limit of Grading
- - - - - -	Dust Fence
—□——□—	Silt Fence
Fill Condition / Cut Condition	Top of Bank
	Bottom of Bank
(hatched box)	Stabilized Entry/Exit
red dashed line	Ordinary High Water Mark
red dash-dot line	Mean Higher High Water

Graphic Scale:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TEMPORARY DETOUR ROADWAY PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Project No. BR-083-1(48)

Scale: AS NOTED Date: DECEMBER 2013

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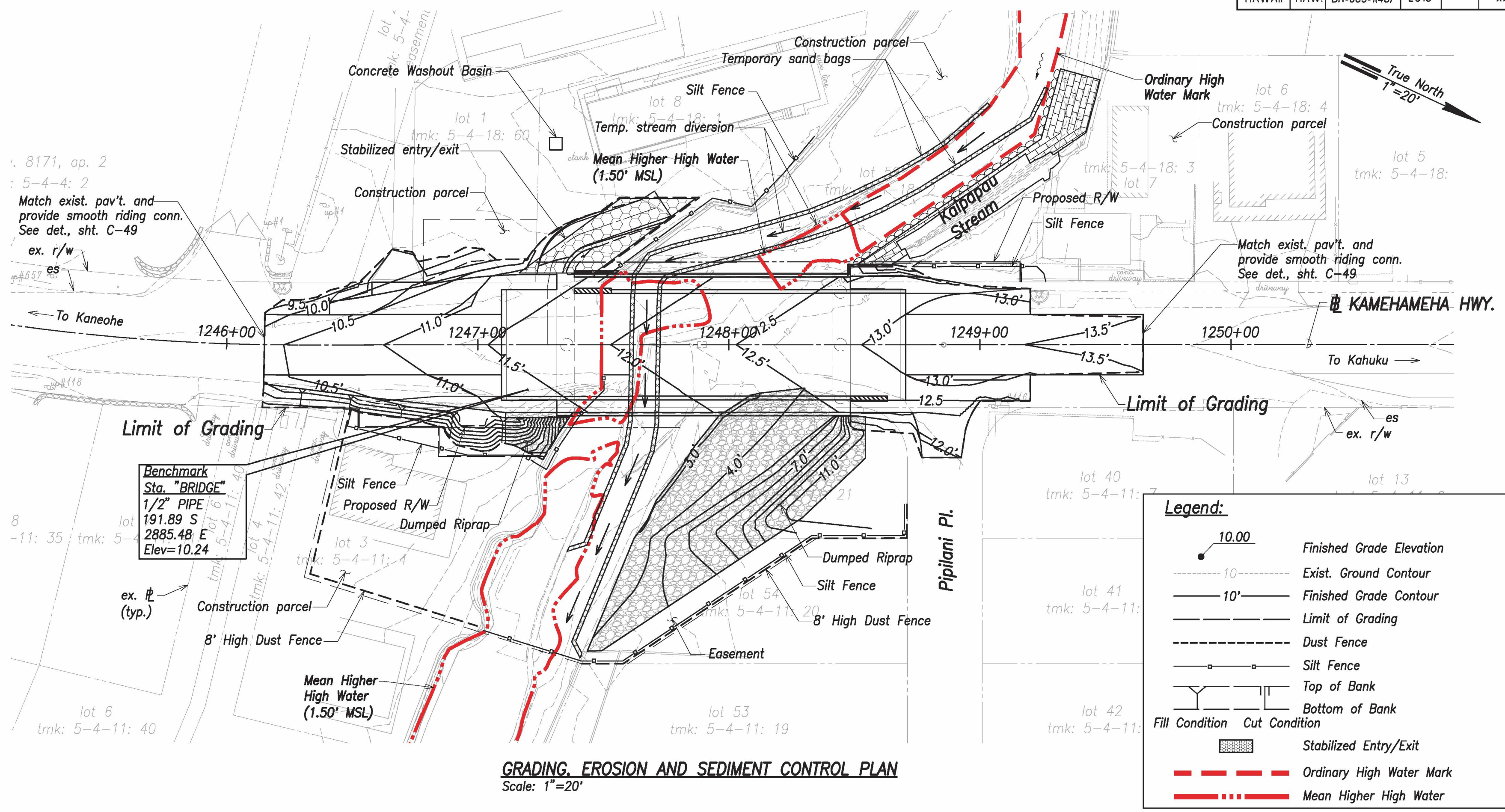
HAWAII	HAW.	BR-083-1(48)	2015		xx



GRADING, EROSION AND SEDIMENT CONTROL PLAN

Scale: 1"=20'

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING, EROSION AND SEDIMENT CONTROL PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Project No. BR-083-1(48)

Scale: AS NOTED Date: DECEMBER 2013

SHEET No. OF SHEETS

ORIGINAL PLAN / NOTE BOOK / No. — SURVEY PLOTTED BY / DRAWN BY / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY — DATE

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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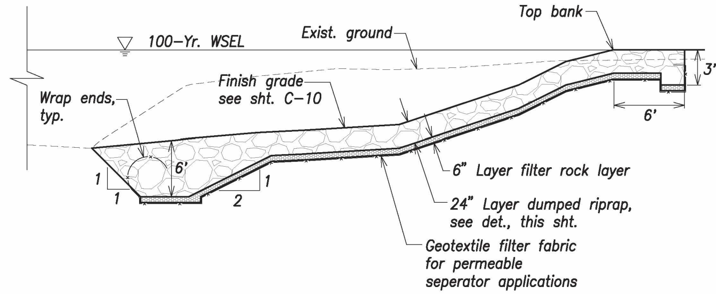

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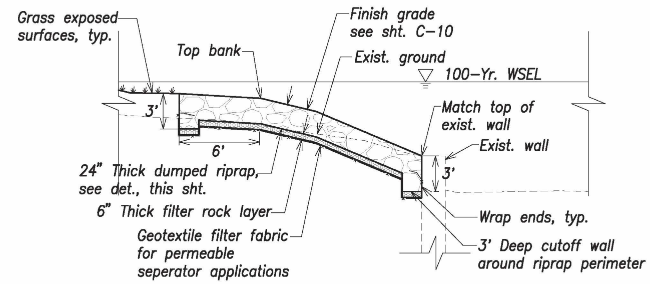

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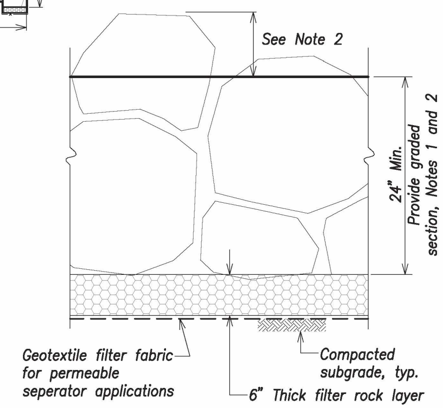
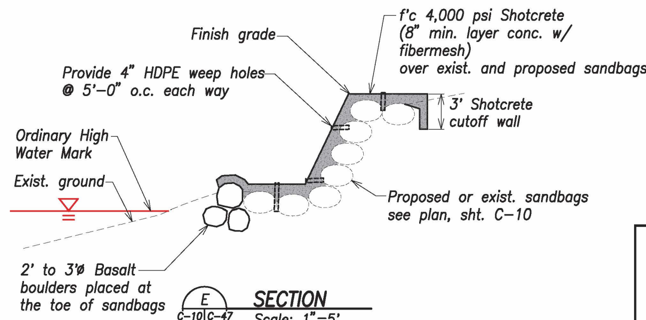


Notes:

1. Riprap shall be basalt rock and consist of 18"ø average stone size, 30"ø maximum stone size.
2. Riprap gradation:
   D_{85} = 2–0"
   D_{50} = 1'–6"
   D_{15} = 6"
3. 12" Max. from highest adjacent rock finish top.

DUMPED RIPRAP
Not to Scale



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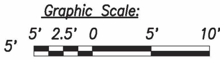

Scale in Feet

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4/30/14
SIGNATURE LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STREAM BANK STABILIZATION & MISCELLANEOUS SECTIONS

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Project No. BR–083–1(48)

Scale: AS NOTED Date: DECEMBER 2013

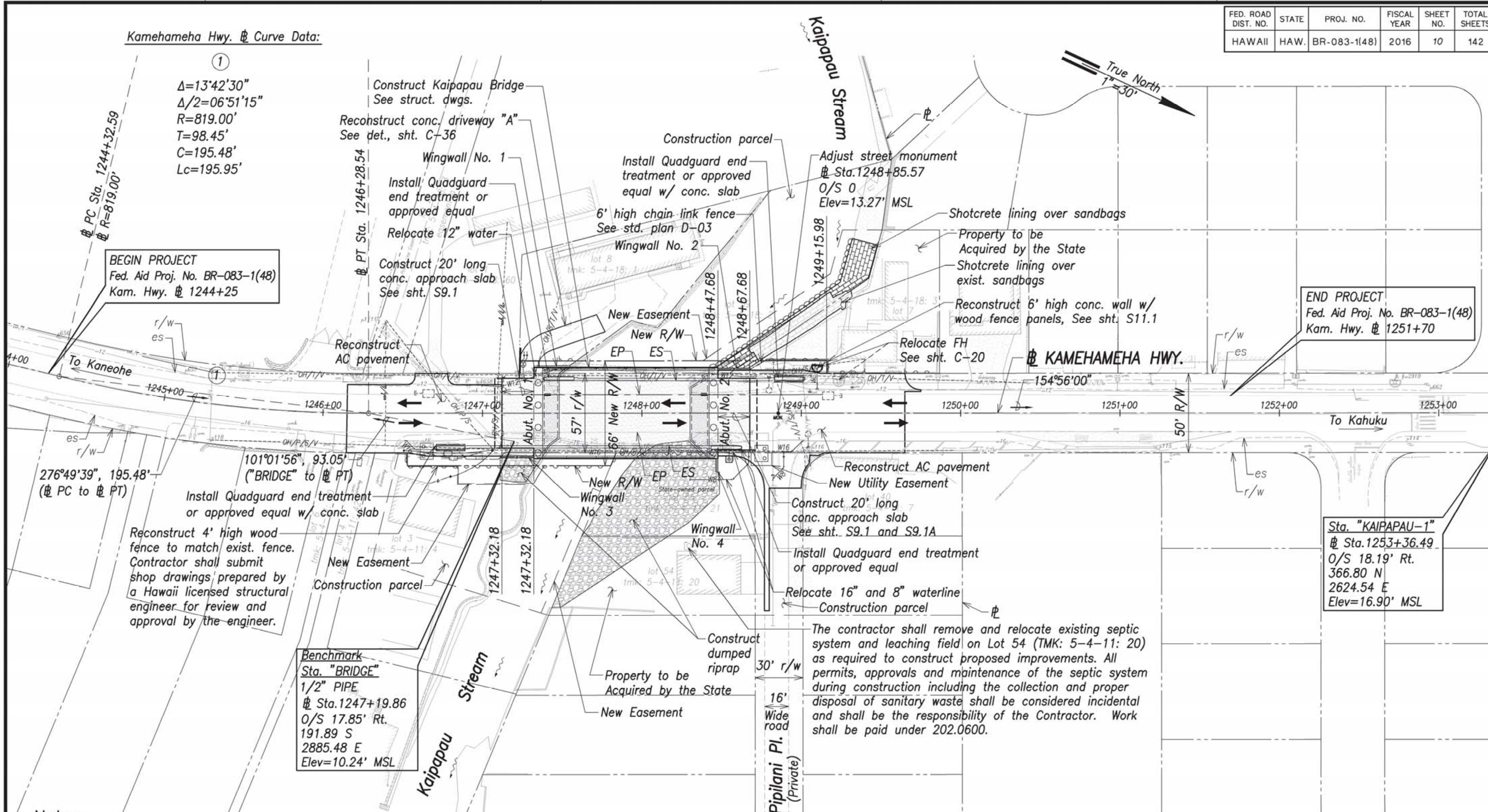
SHEET No. C-47 OF SHEETS

RMTC JOB NO. : 1–19548–0E

Attachment B

Construction Drawings

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	10	142



GENERAL SITE PLAN

SCALE 1"=30'

Notes:

1. See sheet C-10 for construction phasing and sheet C-29 for 16" waterline phasing.
2. The Contractor shall comply with Environmental Permit Conditions.
3. Kaipapau Stream is able to convey a 2-year storm, 1-hour storm. The stream frequently overtops. It is critical that the Contractor shall ensure that the flow capacity of the Kaipapau Stream is not reduced during a storm event. Equipment and materials within the stream during a storm event shall be removed immediately. Final damages that occur due to the contractor equipment and materials blocking flow during a rain storm will be the contractor's responsibility.
4. The Contractor shall construct a temporary detour road, temporary detour waterline, and other temporary improvements. See sht. C-10.

Graphic Scale:

1" = 30' — 30' 15' 0 30' 60'

Scale in Feet

APPROVED:

Manager and Chief Engineer, BWS (for work affecting BWS facilities State R/W & BWS easements only) — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GENERAL SITE PLAN

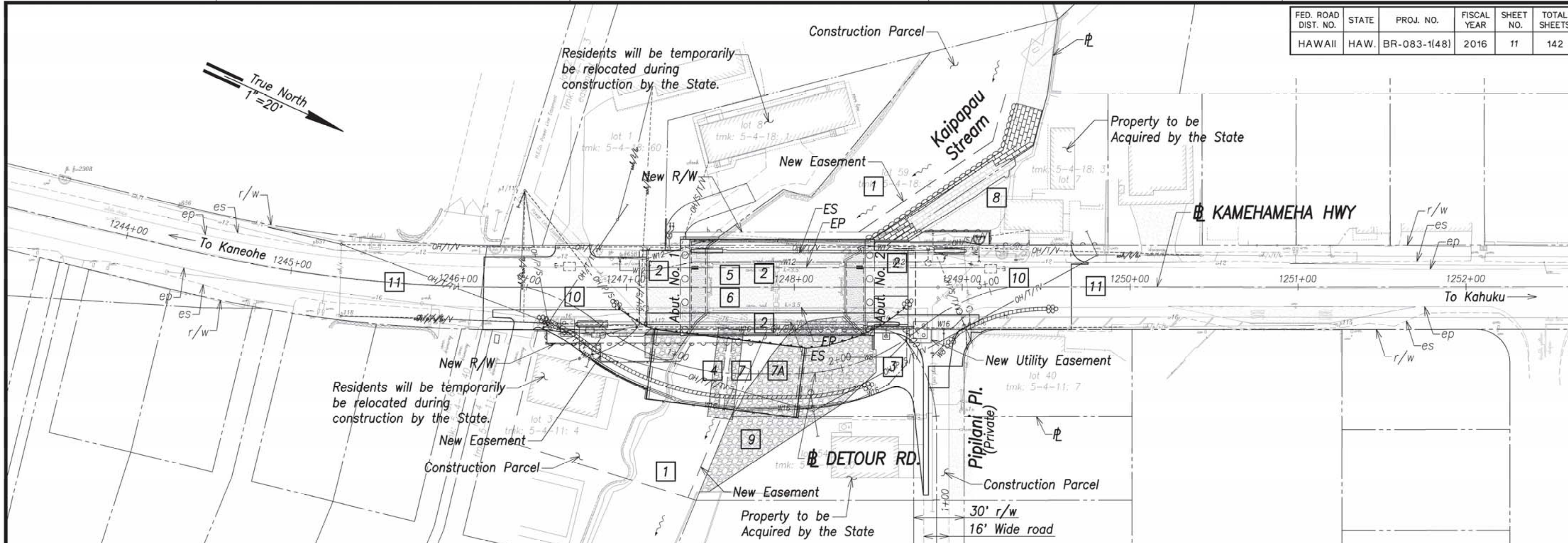
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted — Date: April 2015

SHEET No. C-9 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	11	142



OVERALL CONSTRUCTION PHASING PLAN

Scale: 1"=20'

Suggested Construction Sequence of Major Constuction Items:

1. Install best management practices/erosion control measures. See Notes sheets and sht. C–17.
2. Install temporary 12" waterline and relocate existing 12" water line. See 12" Waterline Plan and Profile, sht. C–20. Relocate electrical utilities. See electrical drawings for temporary and permanent electrical relocation phasing.
3. Construct trial and load test drilled shafts and perform load test. See structural drawings.
4. Construct detour roadway and temporary bridge. See sht. C–22 to C–27 and stuctural drawings.
5. Demolish existing Kaipapau Stream bridge. See sht. C–15 and structural drawings. Expose existing 16" water line jacket and concrete support system.
6. Construct Phase 1 new Kaipapau Stream bridge. See Construction Sequence, Phase 1 of structural drawings, shts. S0.7, S0.7A, and S0.7B.
7. Partially remove Detour roadway and temporary bridge. Construct temporary pavement transitions, signing and pavement markings. Temporary work shall be considered incidental to the various items of work. Construct Phase 2 of new Kaipapau Stream bridge. See Construction Sequence, Phase 2 of structural drawings, shts. S0.8, S0.8A, and S0.8B..

7A. Remove remainder of Detour roadway and temporary bridge.

8. Construct sand bags and shotcrete lining along north bank, upstream of Kaipapau Stream bridge. See sht. C–18.
9. Construct dumped riprap along north and south bank, downstream of Kaipapau Stream bridge. See sht. C–16 and C–18.
10. Construct AC pavement. See sht. C–16. The contractor shall submit a pavement phasing plan and schedule for Engineer's review and approval.
11. Construct final signing and pavement markings. See sht. C–21.

Phasing Notes:

1. For electrical phasing see electrical drawings.
2. For structural phasing see structural drawings.
3. The Contractor shall perform work to ensure continuous traffic and pedestrian flow.
4. Phasing indicated shall not be modified unless approved in writing by the Engineer.
5. The Contractor shall ensure that water and other utility line construction are fully coordinated with Board of Water Supply and Private Utility Companies.
6. All temporary measures required shall be considered incidental to the various items of work.
7. For water line phasing see sht. C–28 and C–29.

Graphic Scale:

1" = 20' — 20' 10' 0 20' 40'

Scale in Feet

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SIGNATURE — LIC. EXPIRATION 4/30/16

R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERALL CONSTRUCTION PHASING PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR–083–1(48)

Scale: As Noted — Date: April 2015

SHEET No. C-10 OF SHEETS

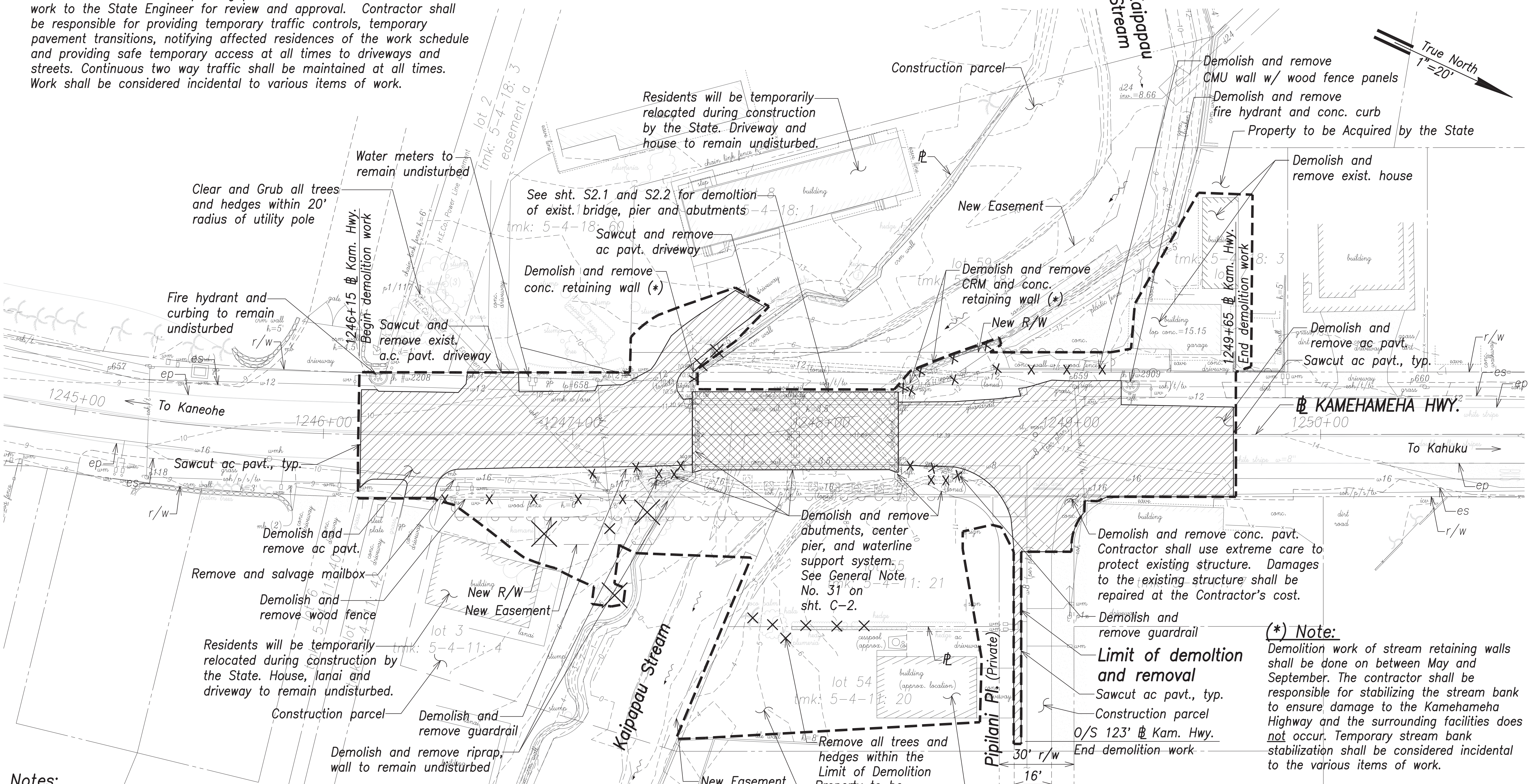
ORIGINAL PLAN	SURVEY PLOTTED BY		DATE
	DRAWN BY	RST	
	TRACED BY		
NOTE BOOK	DESIGNED BY	WC	
	QUANTITIES BY		
No.	CHECKED BY		

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	16	142

Phasing Note:

Contractor shall submit a phasing plan and schedule for demolition work to the State Engineer for review and approval. Contractor shall be responsible for providing temporary traffic controls, temporary pavement transitions, notifying affected residences of the work schedule and providing safe temporary access at all times to driveways and streets. Continuous two way traffic shall be maintained at all times. Work shall be considered incidental to various items of work.



(*) Note:

Demolition work of stream retaining walls shall be done on between May and September. The contractor shall be responsible for stabilizing the stream bank to ensure damage to the Kamehameha Highway and the surrounding facilities does not occur. Temporary stream bank stabilization shall be considered incidental to the various items of work.

Notes:

1. See sheet C-10 for general construction phasing plan.
2. The contractor shall phase demolition work to provide continuous utility service.
3. See C-20 and C-32 for waterline demolition work.
4. See C-21 for signing and striping demolition work.
5. See electrical drawings for electrical demolition and temporary relocation work.
6. See structural drawings for structural demolition work.
7. Traffic controls, detour, and best management practices shall be in place prior to the start of demolition work.
8. The contractor shall demolish and remove everything within the Limit of Demolition and Removal unless otherwise indicated to remain.
9. See General Note No. 30 on sht. C-2.

EXISTING CONDITION & DEMOLITION PLAN

Scale: 1"=20'

Bridge Note:

The contractor shall perform photographic documentation of the existing Kaipapau Stream bridge acceptable to the State Historic Preservation Division (SHPD) prior to the start of bridge demolition. Work shall be considered incidental to the various items of work.

Graphic Scale:

1" = 20' 20' 10' 0 20' 40'

Scale in Feet

ORIGINAL PLAN	SURVEY PLOTTED BY	BSY	DATE
NOTE BOOK	DRAWN BY		
No.	TRACED BY		
	DESIGNED BY	WC	
	QUANTITIES BY		
	CHECKED BY		

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4/30/16

SIGNATURE LIC. EXPIRATION

R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXISTING CONDITION & DEMOLITION PLAN

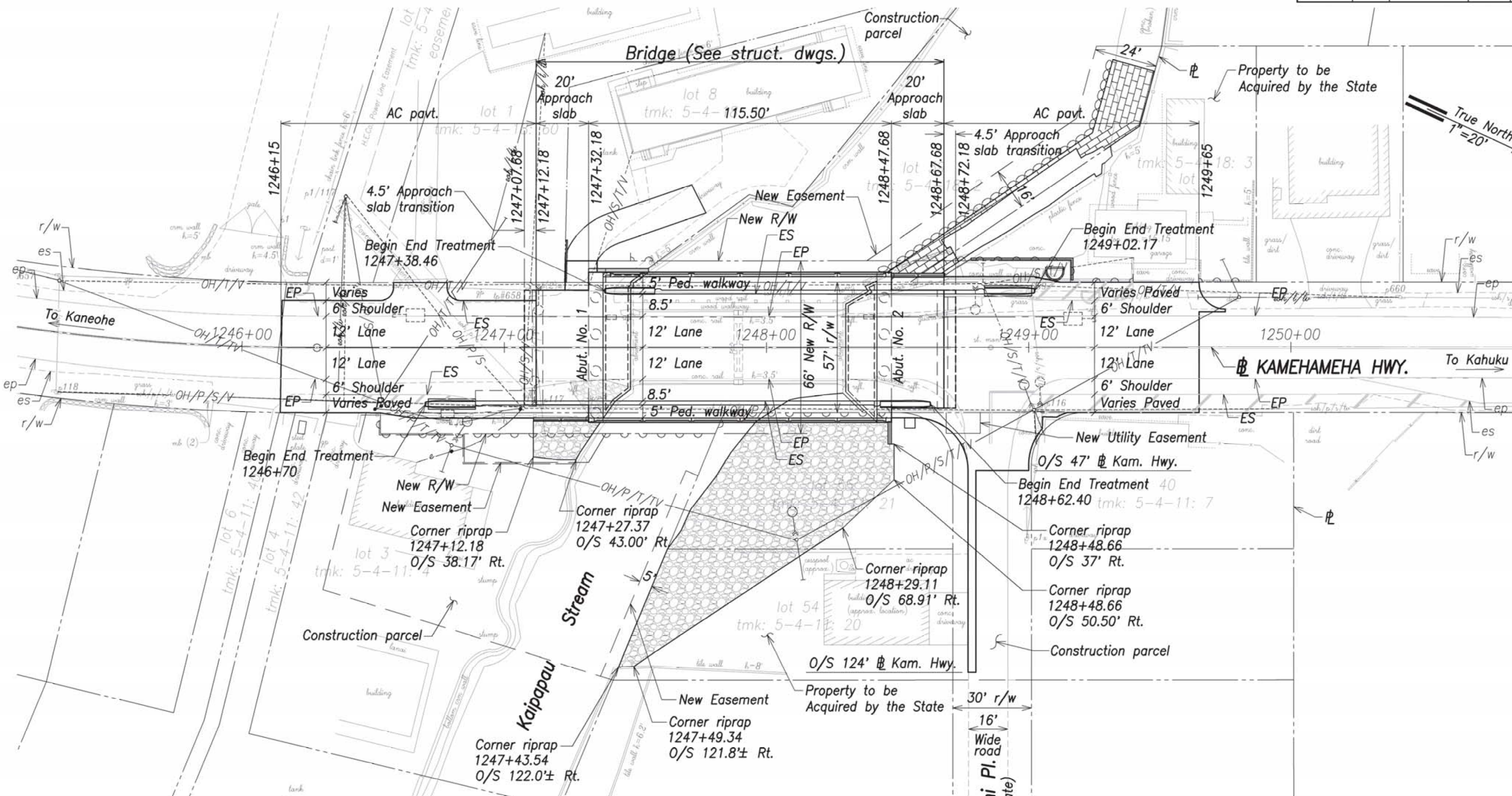
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. C-15 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	17	142



SITE LAYOUT PLAN

SCALE 1"=20'

Pavement Note:

Contractor shall submit a pavement phasing plan and schedule for the AC pavement work to the State Engineer for review and approval. Contractor shall be responsible for providing temporary traffic controls, temporary pavement transitions, notifying affected residences of the work schedule and providing safe temporary access at all times to driveways and streets. Continuous two way traffic shall be maintained at all times. Work shall be considered incidental to various items of work.

Legend:

Dumped Riprap

ORIGINAL PLAN	SURVEY PLOTTED BY	RST
NOTE BOOK	DRAWN BY	
No.	TRACED BY	
	DESIGNED BY	WC
	QUANTITIES BY	
	CHECKED BY	

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SITE LAYOUT PLAN

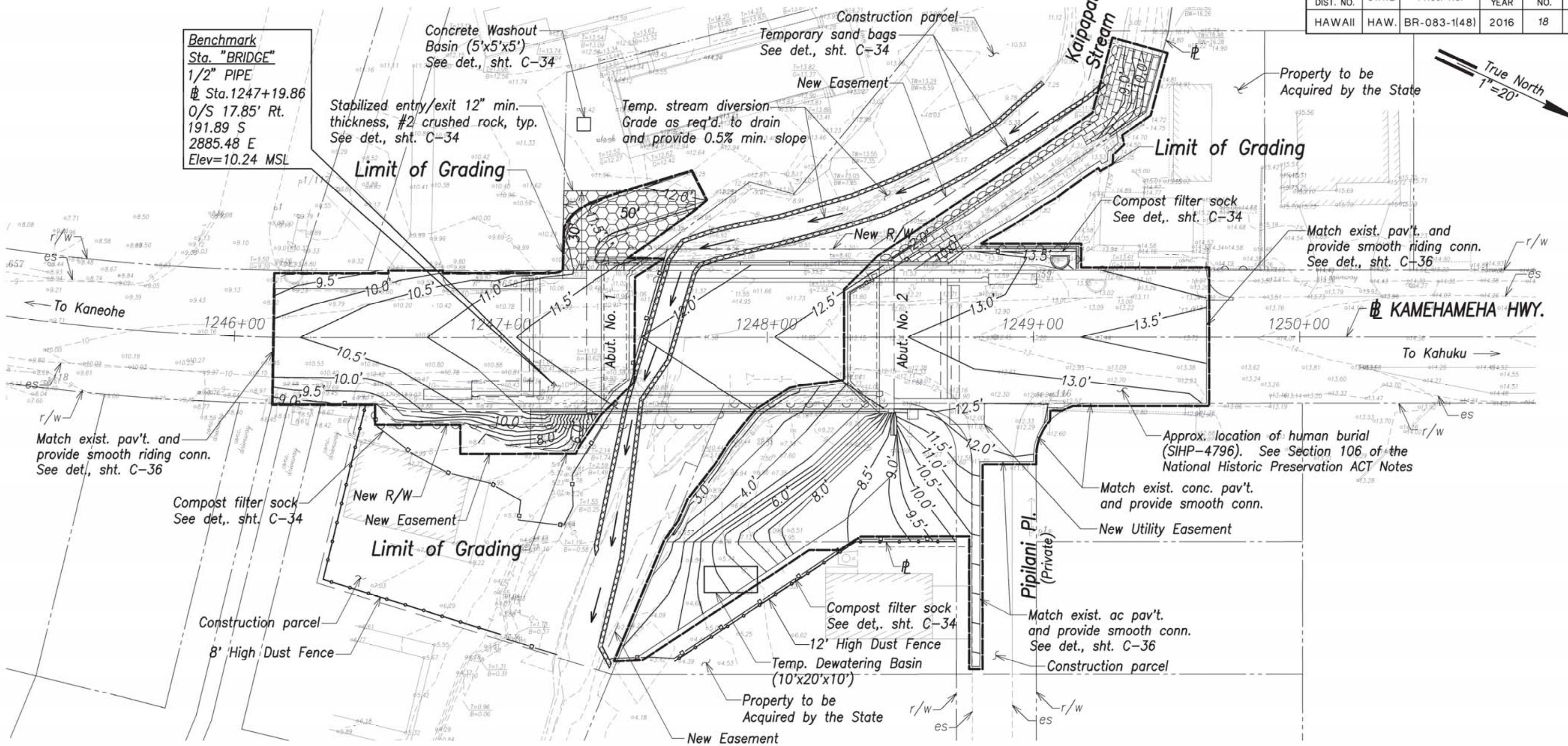
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted — Date: April 2015

SHEET No. C-16 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	18	142



ROADWAY GRADING, EROSION & SEDIMENT CONTROL PLAN

Scale: 1"=20'

Legend:

- 10 — Exist. Ground Contour
- 10 — Finished Grade Contour
- Limit of Grading
- Dust Fence
- Compost Filter Sock
- Top of Bank
- Bottom of Bank
- Fill Condition / Cut Condition
- ← Drainage Flow Direction
- Stabilized Entry/Exit

Notes:

1. For additional finished grade elevations, see sht. C-19.
2. For bridge deck elevations, see structural drawings.
3. For grading work under bridge, see sht. C-18.
4. The contractor shall be responsible for obtaining grading permit from the City and County of Honolulu, Department of Planning and Permitting.

Graphic Scale:
1" = 20' — 20' 10' 0 20' 40'
Scale in Feet

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R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY GRADING, EROSION & SEDIMENT CONTROL PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

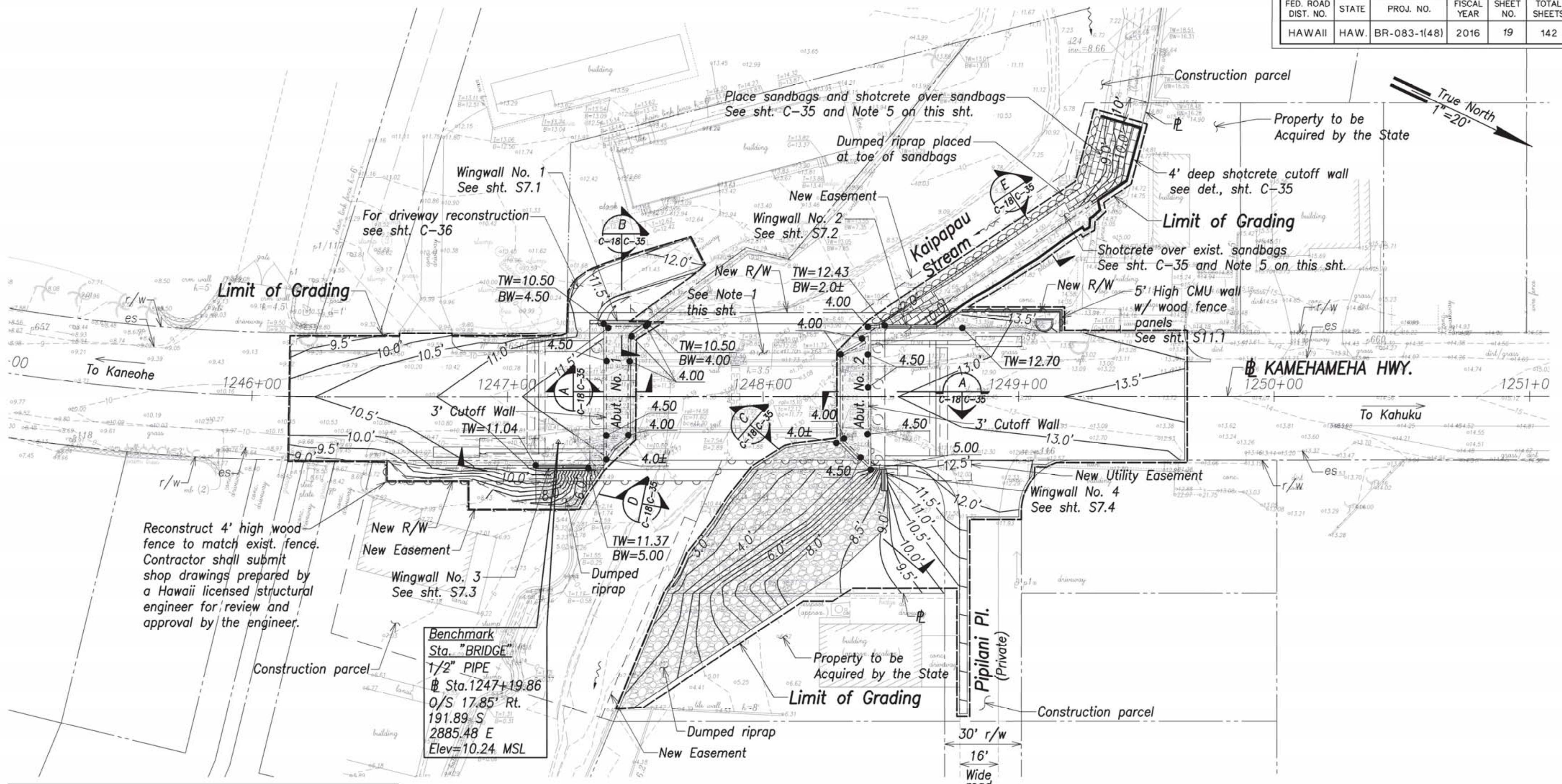
Scale: As Noted — Date: April 2015

SHEET No. C-17 OF SHEETS

ORIGINAL PLAN / NOTE BOOK / No. — SURVEY PLOTTED BY / DRAWN BY / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY — DATE

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	19	142



STREAM SITE & GRADING PLAN

Scale: 1"=20'

Legend:

4.00	Finished spot elevation
TW=10.79	Top of wall spot elevation
BW=4.50	Bottom of wall spot elevation
10	Exist. Ground Contour
10.0'	Finished Grade Contour
	Top of Bank
Fill Condition / Cut Condition	Bottom of Bank
	Drainage Flow Direction

Notes:

1. For bridge deck elevations, see sheet S1.6.
2. The contractor shall phase work as required to construct each phase of improvements.
3. All temporary measures required shall be considered incidental to various items of work.
4. See sheet C-17 for temporary stream diversion work.
5. Shotcrete and wall construction shall be done immediately (within one week) after the demolition of the stream walls.

Graphic Scale:

1" = 20' 20' 10' 0 20' 40'

Scale in Feet

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STREAM SITE & GRADING PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

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Scale: As Noted Date: April 2015

SHEET No. C-18 OF SHEETS

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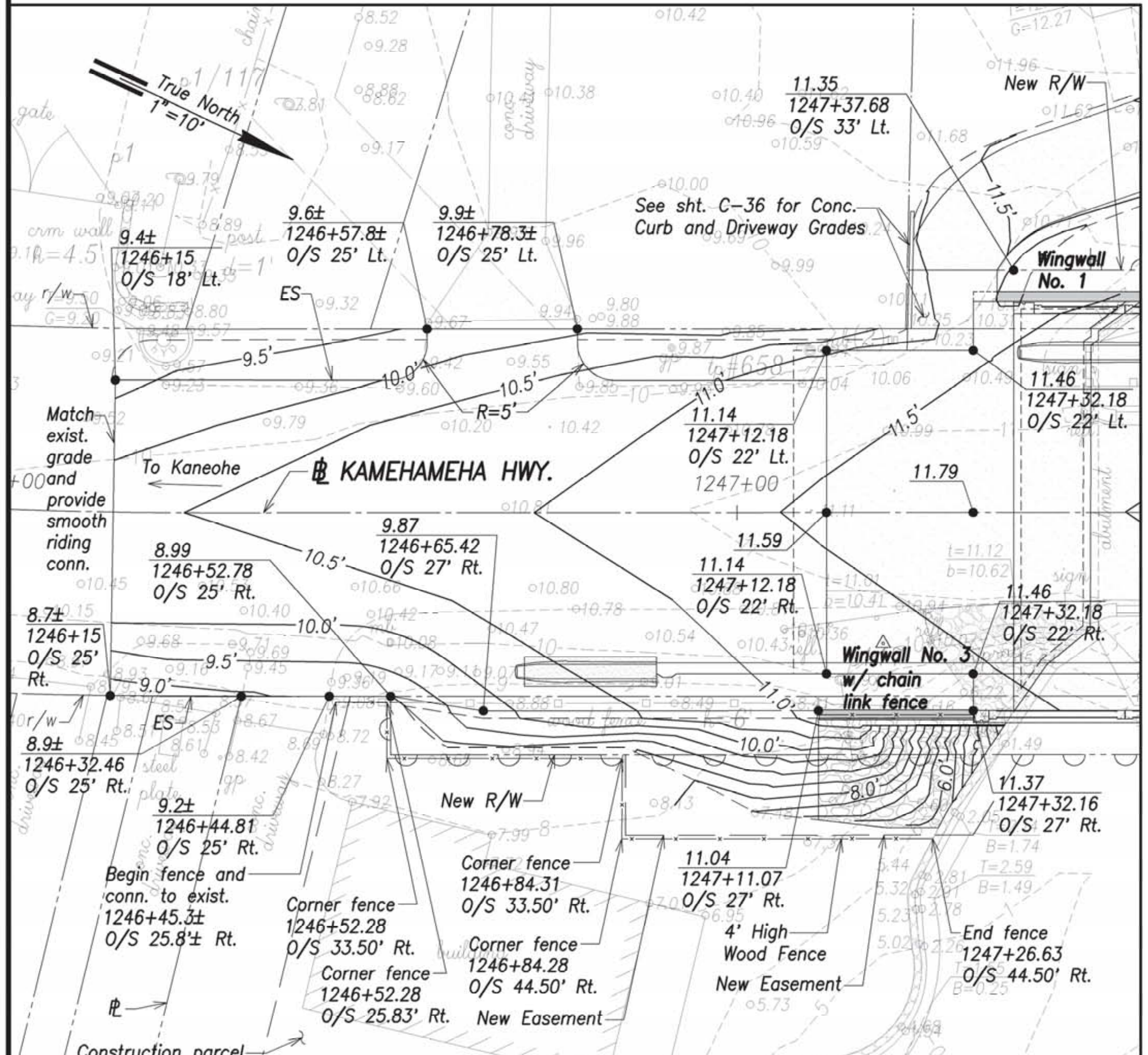
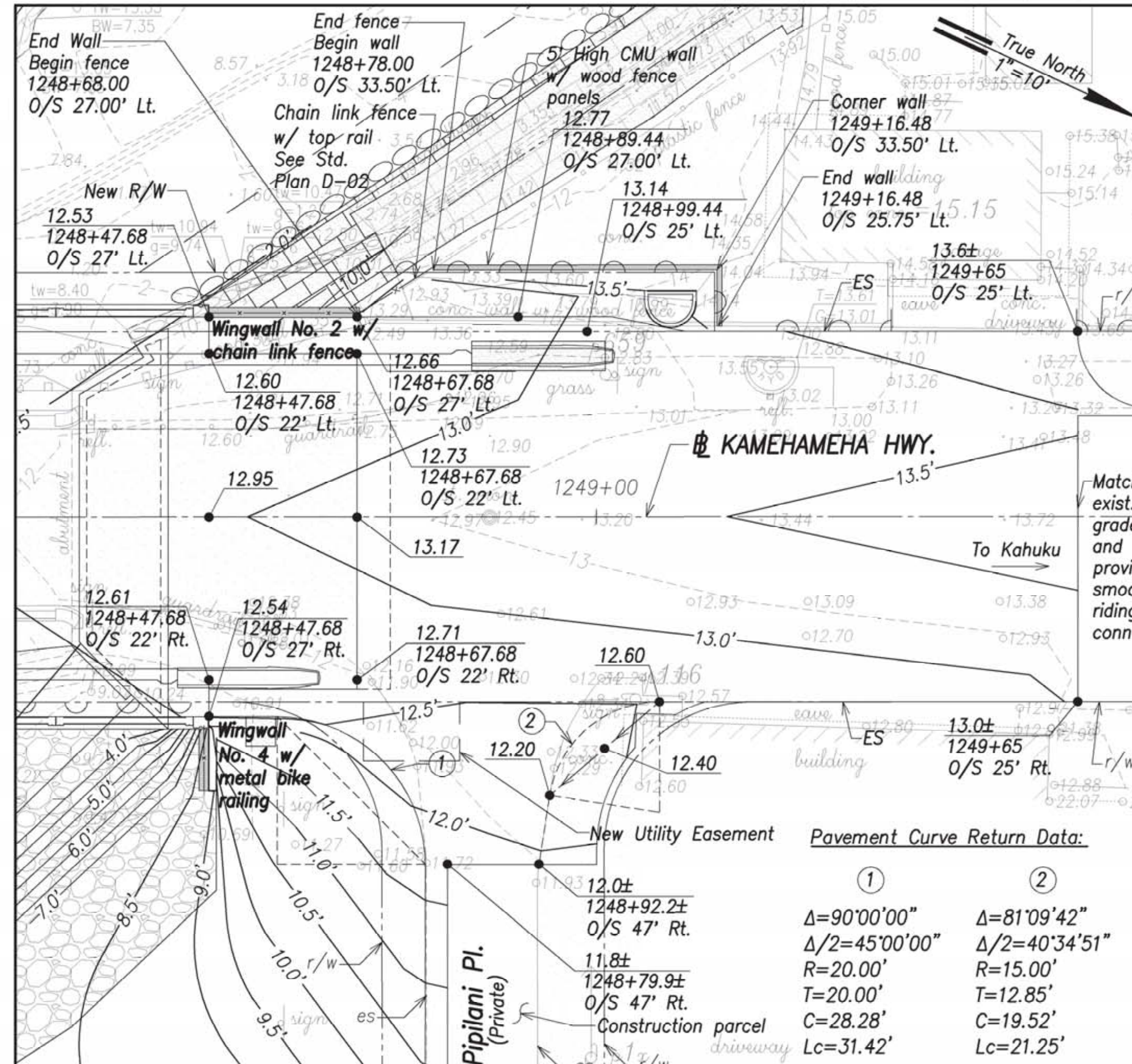
RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	20	142



ENLARGED SITE & ELEVATION PLAN (KANEOHE SIDE)

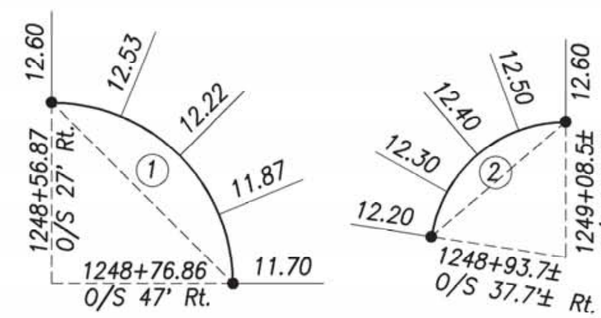
Scale: 1"=10'



ENLARGED SITE & ELEVATION PLAN (KAHUKU SIDE)

Scale: 1"=10'

Pipilani Place
Pavement Curve Return Grades:



Legend:

10	Exist. Ground Contour
10.0'	Finished Grade Contour
10.00 / 2+37.40 / O/S 31.3' Rt.	Finished Grade Elevation / ℄ Station / ℄ Offset

Graphic Scale:
1" = 10' — 10' 5' 0 10' 20'
Scale in Feet

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R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ENLARGED SITE & ELEVATION PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted — Date: April 2015

SHEET No. C-19 OF SHEETS

ORIGINAL PLAN / NOTE BOOK / No. — SURVEY PLOTTED BY / DRAWN BY / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY — DATE

RMTC JOB NO. : 1-19548-0E

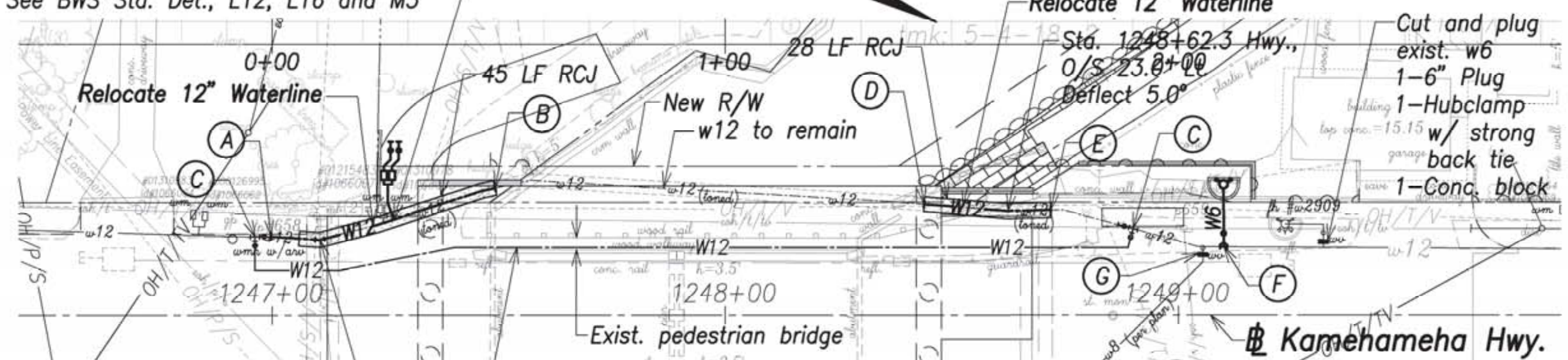
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	21	142

(A) Sta. 1246+99.7± Hwy., O/S 17.5'± Lt. =Sta. 0+00.0± 12" W.L. Deflect 4.0°

(B) Connect to exist. w12
Sta. 1247+49.3± Hwy., O/S 28.2'± Lt. =Sta. 0+51.0± 12" W.L.
Materials for conn.
1–12" Sleeve, 12" long
8± LF 12" D.I.P., Cl. 52
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify invert and location

(C) Connect to exist. w12
Sta. 1246+96± Hwy., O/S 17.4'± Lt. and Sta. 1248+90± Hwy., O/S 19.2'± Lt.
Materials for conn.
1–12" x 12" Tee
2–12" GV, 150#
2–Valve box w/ cover
1–Conc. block w/ struct. struts
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify invert and location

Install Type "C–1" Double Service Lateral and reconnect exist. service
Sta. 1247+26.80 Hwy., O/S 21.2'± Lt.
See BWS Std. Det., L12, L16 and M3



Sta. 1247+10.50 Hwy., O/S 16.70' Lt. =Sta. 0+10.55 12" W.L.
1–12" 1/8 Bend (H & TV)
1–Conc. block

Install temporary 12" fusible PVC waterline. Lay temporary 12" waterline on existing pedestrian walkway. In areas outside of the existing pedestrian walkway and provide temporary ADA accessible route, place temporary waterline in shallow open trench and cover with steel plates. See Temporary Waterline Notes on this sheet.

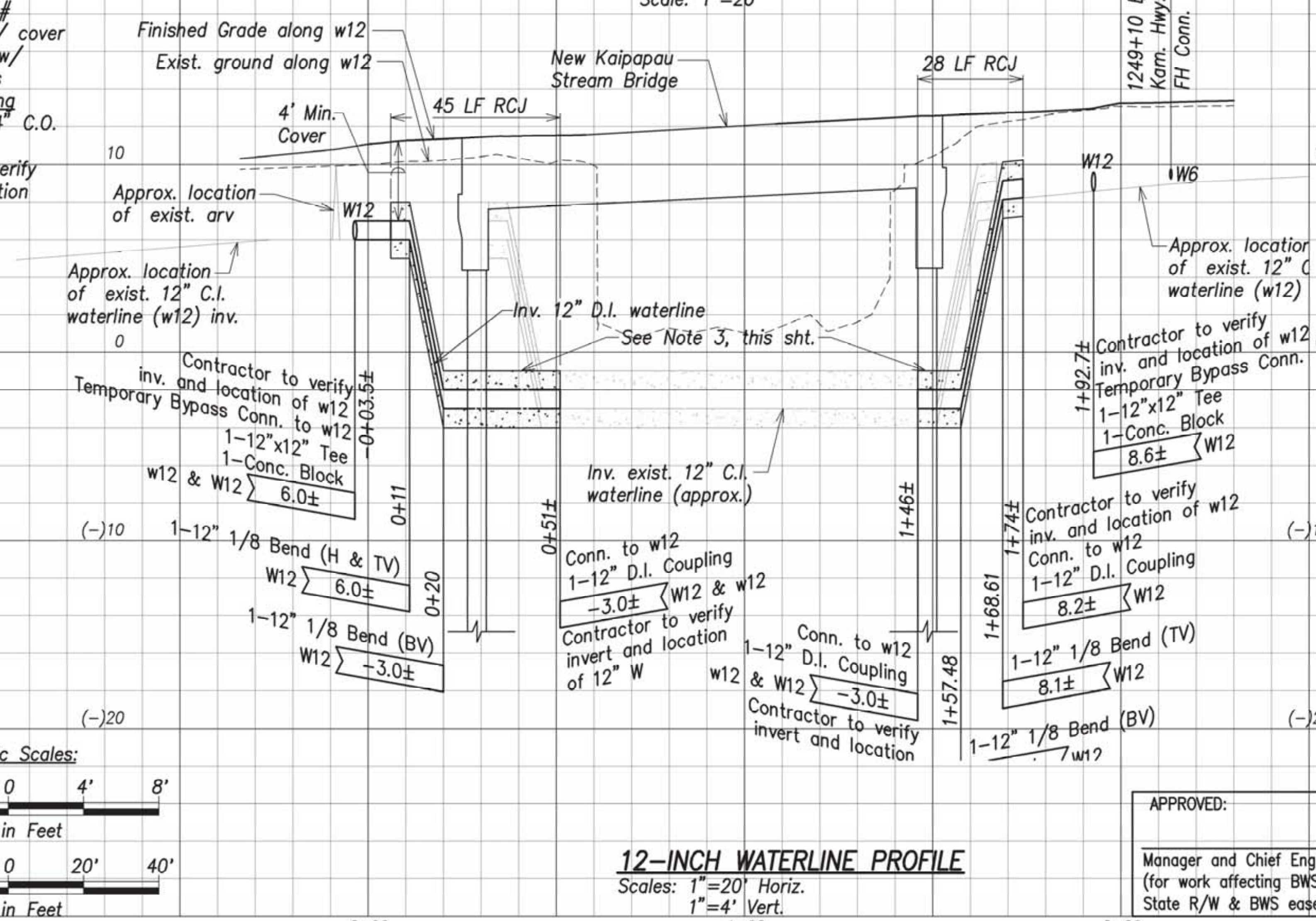
(G) Cut and plug exist. w8 at main. Remove valve and box. Salvage frame and cover.
1–8" Plug
1–Hubclamp w/ strong back tie
1–Conc. block
See sht. C–29 for Phase when work shall be performed.

(D) Connect to exist. w12
Sta. 1248+43.9± Hwy., O/S 24.6'± Lt. =Sta. 1+46.0± 12" W.L.
Materials for conn.
1–12" Sleeve, 12" long
8± LF 12" D.I.P., Cl. 52
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify invert and location

(E) Connect to exist. w12
Sta. 1248+71.9± Hwy., O/S 23.3'± Lt. =Sta. 1+74± 12" W.L.
Materials for conn.
1–12" Sleeve, 12" long
8± LF 12" D.I.P., Cl. 52
1–12" 1/8 Bend (TV)
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify invert and location

(F) FH Connection
Sta. 1249+10 Hwy.
O/S 15.1'± Lt.
1–12" x 6" Tapping Tee (MJ x FE)
1–6" 1/4 Bend (BV)
1–6" GV (MJ x FE), Cl. 150
1–Valve box
1–FH (Ht.=6'–4")
1–FH Extension piece
1–FH Marker
1–FH Curb guard
14 LF 6" D.I.P. Cl. 52
1–Conc. block
1–Conc. block w/ struct. struts
See BWS Std. Det. FH4 and FH11
For Profile, see sht. C–37
Temp. for Testing
1–6" cap w/ 2–1/2" C.O.
1–Conc. block

12–INCH WATERLINE PLAN
Scale: 1"=20'



Notes:

1. The existing waterlines shown on these plans were located using record drawings and toning information from the Board of Water Supply. The contractor shall make an independent check by probing the waterlines and coordinating with the Board of Water Supply to ascertain the exact locations of the waterlines. Any discrepancies shall be immediately brought to the attention of the Engineer prior to any work on the water system.
2. Demolish and remove existing waterline as required to construct waterline.
3. Dewatering for removal of water system shall be considered inciental to Item No. 202.0520.
4. Dewatering for installation of the temporary and pernanent water system shall be considered incidental to Item No. 624.1003 Water Systems. No additional compensation will be provided for dewatering.

Temporary Waterline Notes:

1. The temporary waterline shall be constructed, tested and in–service prior to starting construction of permanent water system. The contractor shall coordinate with the Board of Water Supply (BWS) for shut–down of the 12–inch waterline. The maximum down time shall be six (6) hours unless otherwise approved by the BWS. The contractor shall be responsible for providing advanced notification to all users affected by the waterline shut–down.
2. The temporary waterline shall not be in–service for more than two (2) months unless otherwise approved by the BWS.
3. Contractor to provide all fittings, bends as required and install temporary 3/4" ARV in cage at high point of temporary waterline
4. The contractor shall be responsible for providing safe temporary pedestrian access at all times that meets ADA requirements.
5. The contractor shall be responsible for providing traffic controls during temporary waterline installation.

Graphic Scales:
1" = 4' — 4' 2' 0 4' 8' — Scale in Feet
1" = 20' — 20' 10' 0 20' 40' — Scale in Feet

12–INCH WATERLINE PROFILE
Scales: 1"=20' Horiz.
1"=4' Vert.

APPROVED:
Manager and Chief Engineer, BWS (for work affecting BWS facilities State R/W & BWS easements only) — DATE

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4/30/16
SIGNATURE — LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

12–INCH WATERLINE PLAN & PROFILE
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR–083–1(48)

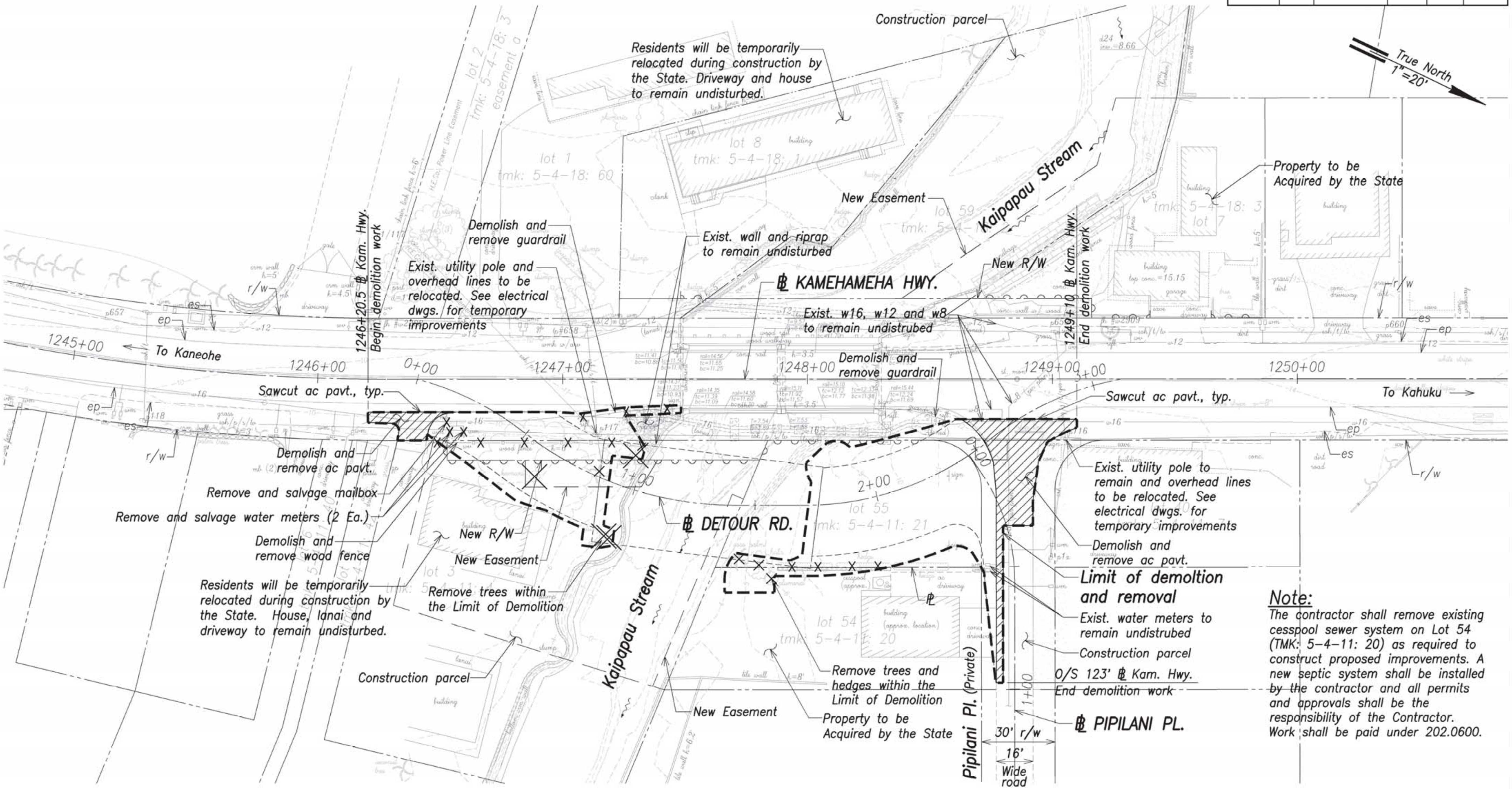
Scale: As Noted — Date: April 2015

SHEET No. C-20 OF SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	RST
	TRACED BY	
NOTE BOOK	DESIGNED BY	WC
	QUANTITIES BY	
No.	CHECKED BY	

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	25	142



Note:
The contractor shall remove existing cesspool sewer system on Lot 54 (TMK: 5-4-11: 20) as required to construct proposed improvements. A new septic system shall be installed by the contractor and all permits and approvals shall be the responsibility of the Contractor. Work shall be paid under 202.0600.

DETOUR ROAD – EXISTING CONDITION & DEMOLITION PLAN

Scale: 1"=20'

Graphic Scale:
1" = 20'   20' 10' 0   20'   40'
Scale in Feet

ORIGINAL PLAN	SURVEY PLOTTED BY	RST	DATE
NOTE BOOK	DRAWN BY		
No.	TRACED BY		
	DESIGNED BY	WC	
	QUANTITIES BY		
	CHECKED BY		

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4/30/16
SIGNATURE   LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETOUR RD. – EXISTING CONDITION & DEMOLITION PLAN

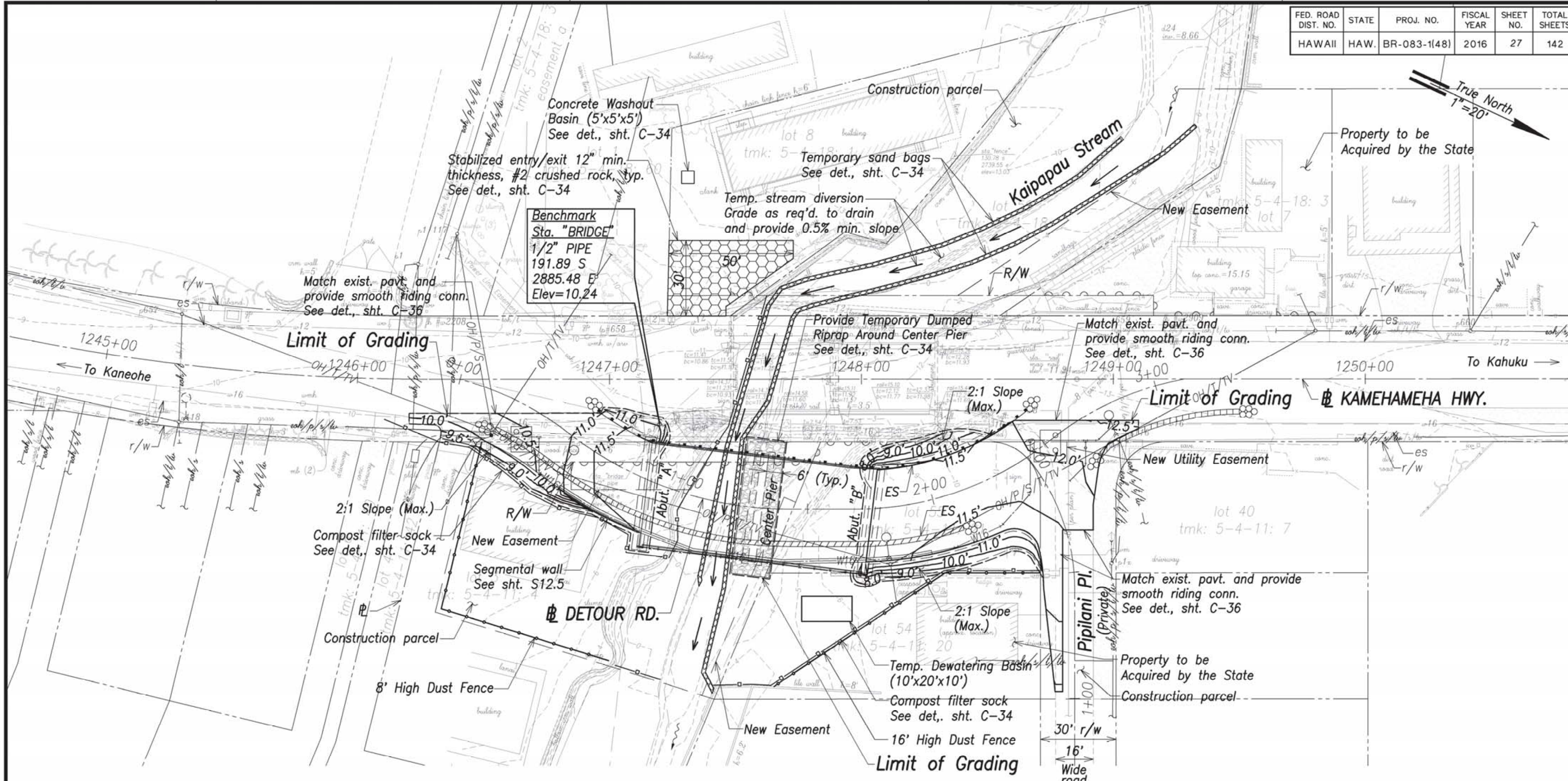
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted   Date: April 2015

SHEET No. C-24 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	27	142



DETOUR ROAD – GRADING, EROSION AND SEDIMENT CONTROL PLAN

Scale: 1"=20'

Legend:

10	Exist. Ground Contour
10.0'	Finished Grade Contour
	Limit of Grading
	Dust Fence
	Compost Filter Sock
	Drainage Flow Direction
	Stabilized Entry/Exit

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

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4/30/16
SIGNATURE LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETOUR ROAD-GRADING, EROSION AND SEDIMENT CONTROL PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

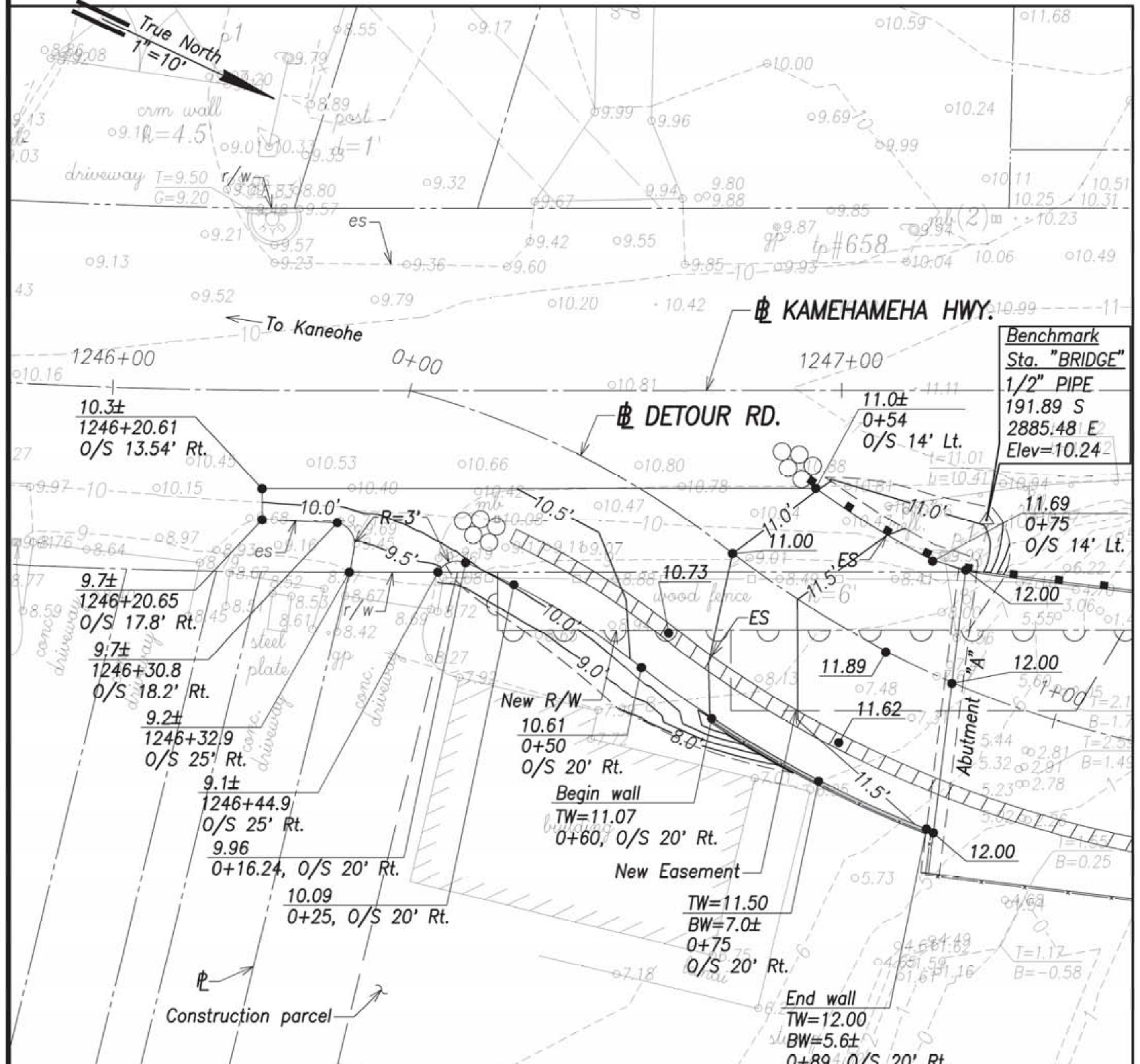
Scale: As Noted Date: April 2015

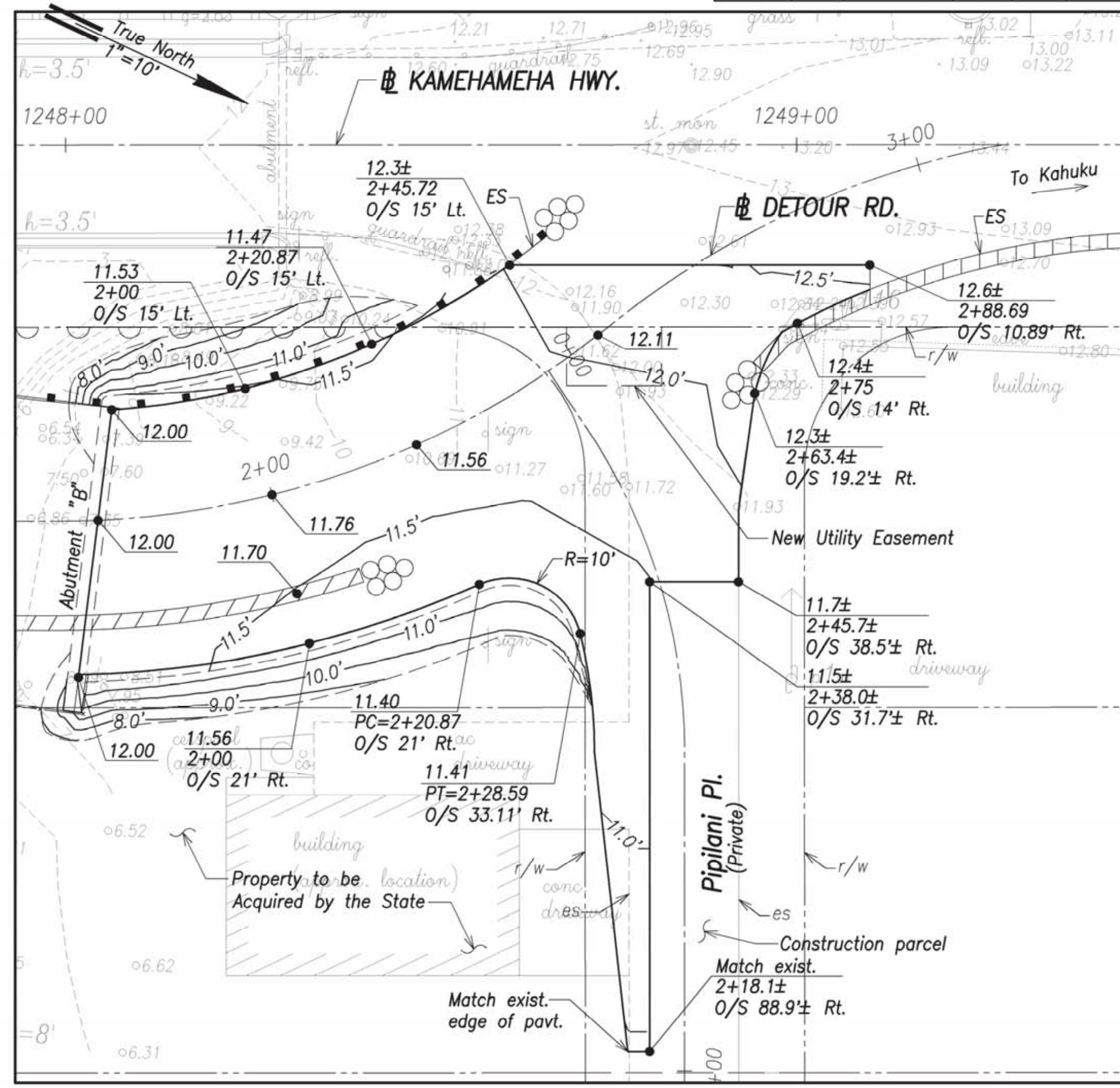
SHEET No. C-26 OF SHEETS

ORIGINAL PLAN | NOTE BOOK | No. | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY BST | QUANTITIES BY WC | CHECKED BY | DATE

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	28	142





DETOUR ROAD ENLARGED SITE & ELEVATION PLAN (KANEOHE SIDE)

Scale: 1"=10'

DETOUR ROAD ENLARGED SITE & ELEVATION PLAN (KAHUKU SIDE)

Scale: 1"=10'

Legend:

- 10 — Exist. Ground Contour
- 10.0' — Finished Grade Contour
- 10.00 / 2+37.40 / O/S 31.3' Rt. — Finished Grade Elevation / ℄ Station / ℄ Offset

Graphic Scale:

1" = 10' 10' 5' 0 10' 20'

Scale in Feet

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SIGNATURE 4/30/16 LIC. EXPIRATION

R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETOUR ROAD ENLARGED SITE & ELEVATION PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

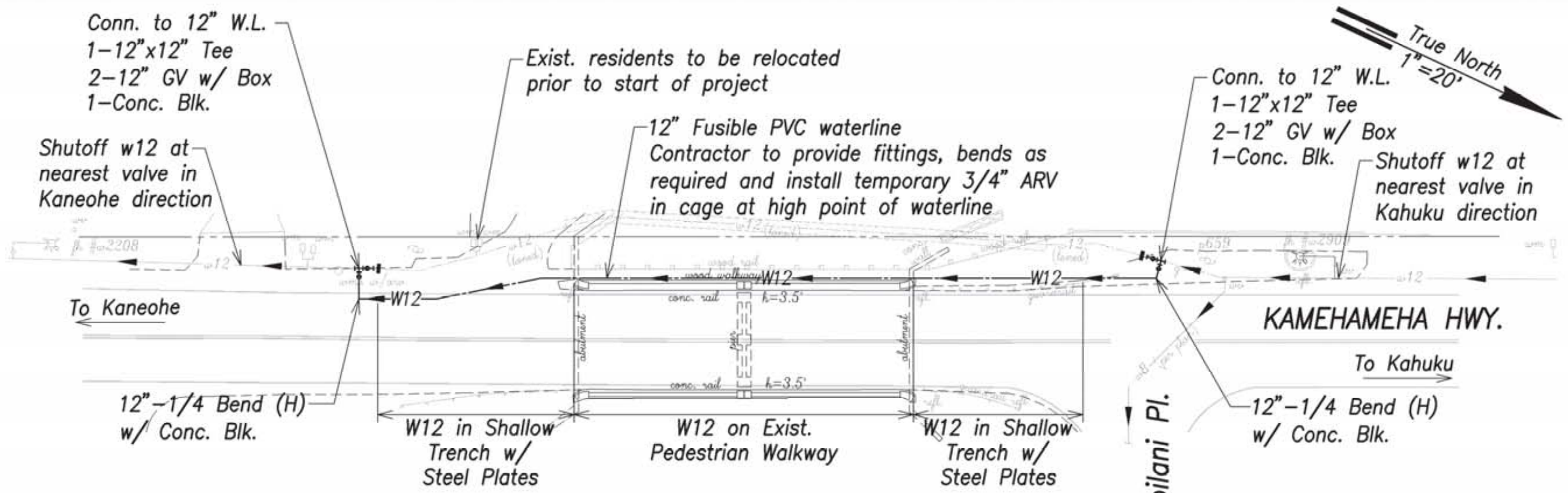
Scale: As Noted Date: April 2015

SHEET No. C-27 OF SHEETS

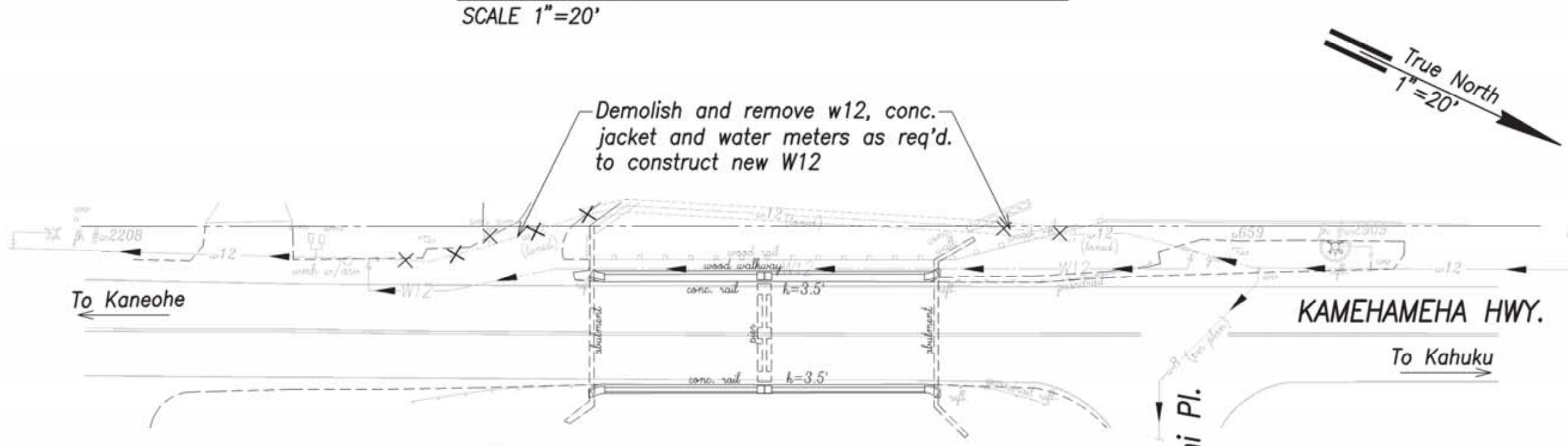
ORIGINAL PLAN | NOTE BOOK | No. | SURVEY PLOTTED BY | DRAWN BY BST | TRACED BY | DESIGNED BY WC | QUANTITIES BY | CHECKED BY | DATE

RMTC JOB NO. : 1-19548-0E

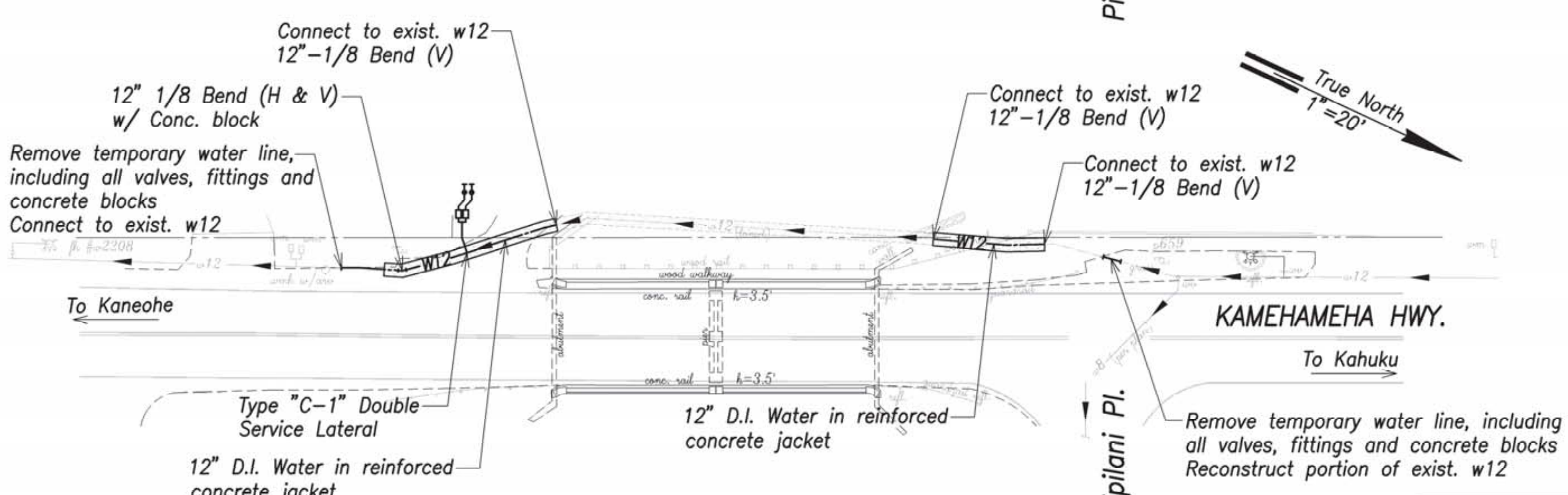
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	29	142



12" WATERLINE SCHEMATIC PLAN – PHASE 1
SCALE 1"=20'



12" WATERLINE SCHEMATIC PLAN – PHASE 2
SCALE 1"=20'



12" WATERLINE SCHEMATIC PLAN – PHASE 3
SCALE 1"=20'

Suggested Phasing for Work on 12" Waterline:

PHASE 1:
Construct temporary bypass waterline improvements shown on this sheet and perform pressure test and chlorination. Shutoff existing w12 by closing the nearest existing valves in the Kaneohe and Kahuku direction and make connections to the existing w12. (Note: Maximum allowable time for w12 shutdown is 6 hours.)

PHASE 2:
Excavate trench and construct shoring for new W12 improvements. Remove portions of existing w12 in concrete jacket required to construct new improvements.

PHASE 3:
Construct permanent waterline improvements shown on this sheet and perform pressure test and chlorination. Shutoff existing w12 by closing the nearest existing valves in the Kaneohe and Kahuku direction and make connections to the existing w12. Remove W12 bypass waterline, including all gate valves, fittings and concrete blocks on both sides of existing bridge. (Note: Maximum allowable time for w12 shutdown is 6 hours.)

Note:
The contractor shall check the invert and location of the existing 12-inch waterline prior to the start of waterline construction and adjust the invert of the new 12-inch waterline to match the existing invert for future connection.

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

APPROVED:

Manager and Chief Engineer, BWS (for work affecting BWS facilities State R/W & BWS easements only) DATE

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4/30/16
SIGNATURE LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

12" WATERLINE PHASING PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

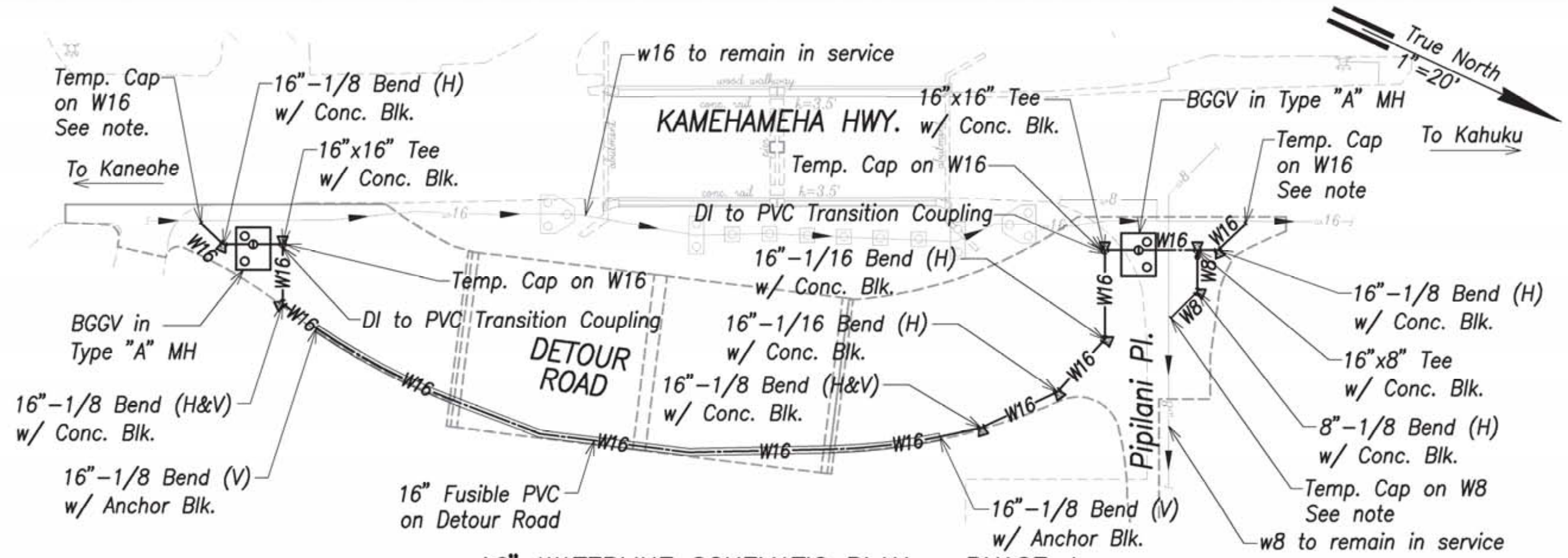
Scale: As Noted Date: April 2015

SHEET No. C-28 OF SHEETS

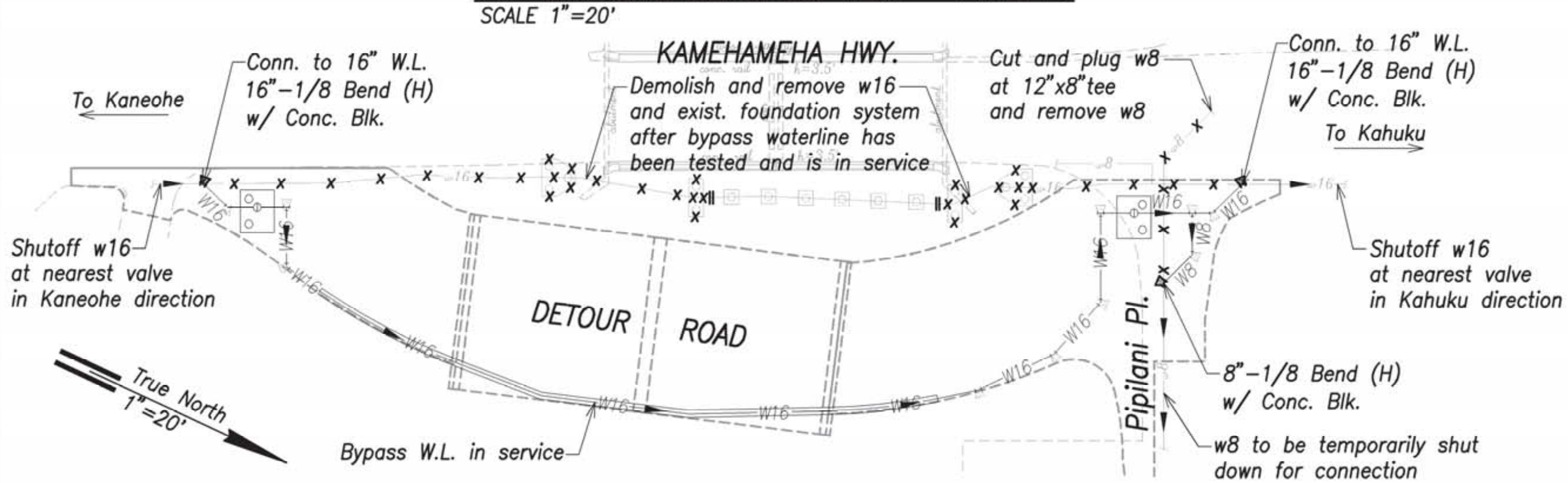
ORIGINAL PLAN	SURVEY PLOTTED BY		DATE
NOTE BOOK	DRAWN BY	RST	
No.	TRACED BY		
	DESIGNED BY	WC	
	QUANTITIES BY		
	CHECKED BY		

RMTC JOB NO. : 1-19548-0E

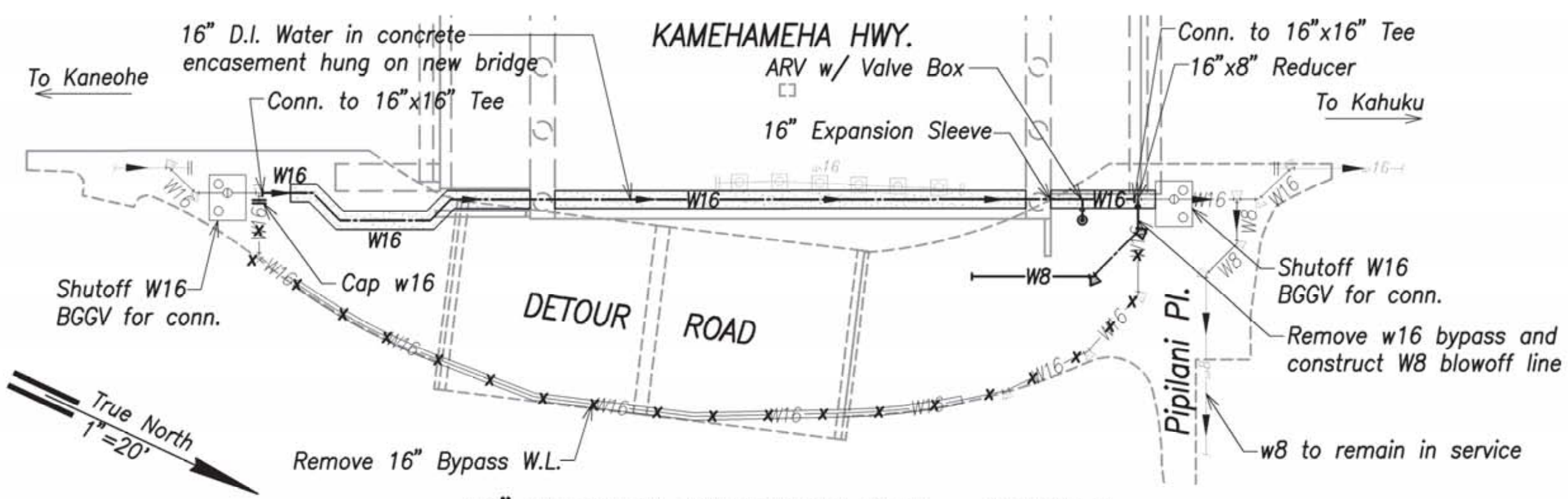
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	30	142



16" WATERLINE SCHEMATIC PLAN – PHASE 1
SCALE 1"=20'



16" WATERLINE SCHEMATIC PLAN – PHASE 2
SCALE 1"=20'



16" WATERLINE SCHEMATIC PLAN – PHASE 3
SCALE 1"=20'

Suggested Phasing for Work on 16" Waterline:

PHASE 1:
Existing w16 and w8 serving Pipilani Road shall remain in service at all times. Construct detour road and temporary bridge. Construct Phase 1 waterline improvements shown on this sheet and perform pressure test and chlorination.

PHASE 2:
Shutoff existing w16 by closing the nearest existing valves in the Kaneohe and Kahuku direction. Drain w16 using existing w8 blowoff line. Construct Phase 2 waterline improvements shown on this sheet. Open existing valves to restore water service. (Note: Maximum allowable time for w16 and w8 shutdown is 8 hours)

After temporary W16 waterline is in service, demolish and remove the existing w16 and existing foundation system shown in Phase 2 on this sheet. Abandon–in–place the existing w16 and existing foundation system under Kaipapau Stream. The contractor shall plug both ends of abandoned waterline.

PHASE 3:
Construct new bridge and Phase 3 waterline improvements, including W8 blowoff line and W16 encased in concrete between new bridge girders, as shown on this sheet. See structural drawings for details. Perform pressure test and chlorination. Shutoff W16 bypass waterline using bevel gear gate valves on both sides of new bridge. (Note: Maximum allowable time for W16 is 8 hours) Connect W16 on both sides of new bridge. Open bevel gear gate valves to restore water service.

After W16 waterline is in service, demolish and remove the bypass waterline.

Note:
The contractor shall check the invert and location of the existing 16–inch waterline prior to the start of waterline construction and adjust the invert of the new 16–inch waterline to match the existing invert for future connection.

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

ORIGINAL PLAN | NOTE BOOK | No.
SURVEY PLOTTED BY | DRAWN BY | TRACED BY BST | DESIGNED BY WC | QUANTITIES BY | CHECKED BY | DATE

APPROVED:
Manager and Chief Engineer, BWS (for work affecting BWS facilities State R/W & BWS easements only) DATE

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4/30/16
SIGNATURE LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

16" WATERLINE PHASING PLAN

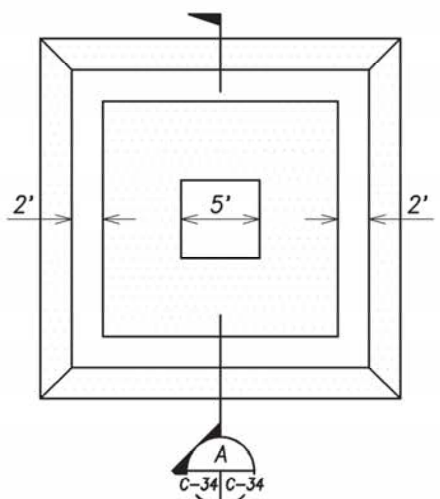
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR–083–1(48)

Scale: As Noted Date: April 2015

SHEET No. C-29 OF SHEETS

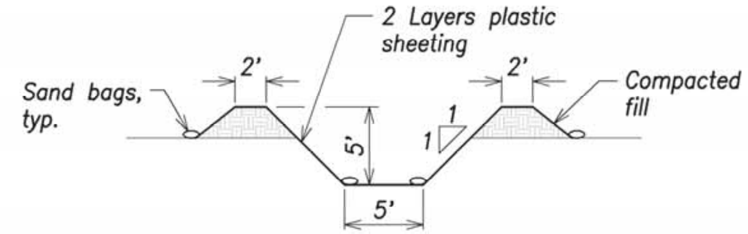
RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	35	142



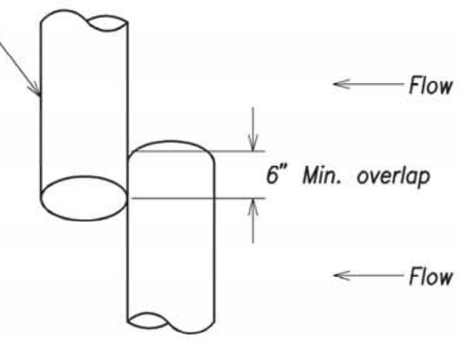
PLAN VIEW

Notes:
1. Line basin with 2 layers of 4 mil. polyethylene plastic.
2. Place sand bags on top sheeting.
3. Clean out hardened concrete to maintain basin capacity.

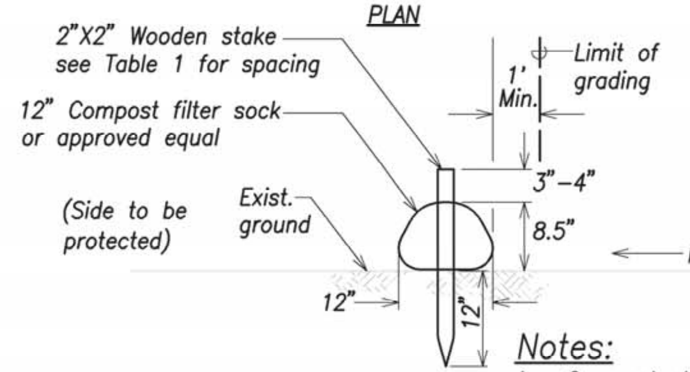


A SECTION
C-34 | C-34

CONCRETE WASH-OUT BASIN DETAIL
NOT TO SCALE



PLAN



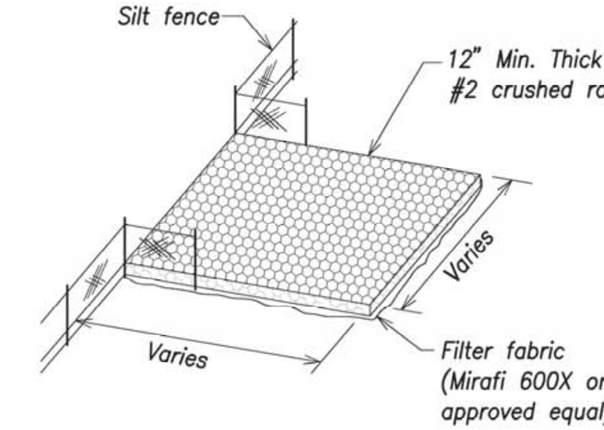
SECTION

Notes:
1. Compost shall not contain biosolids and should be consistent with EPA guidelines as well as meet all local, state and federal quality requirements.
2. Contractor shall inspect compost filter socks when as required by the project SWPPP.

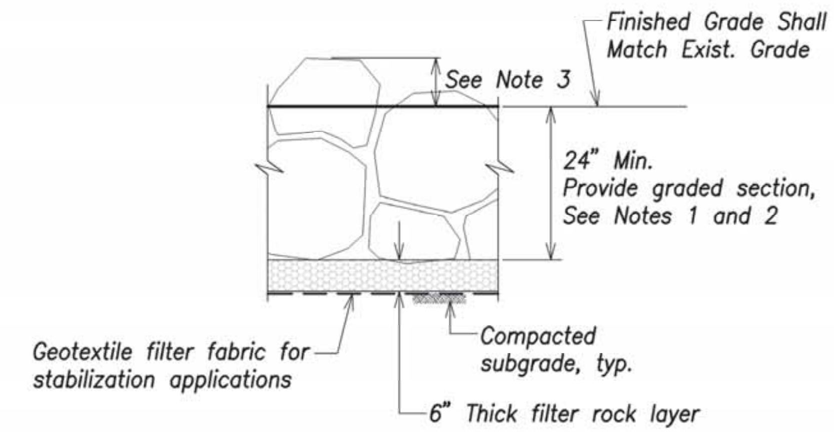
Table 1: Wooden stake anchor spacing

Slope	Anchor spacing
< 4:1	Not required
4:1 to 3:1	10' O.C.
> 3:1 to 2:1	5' to 10' O.C.
> 2:1	5' O.C.

COMPOST FILTER SOCK DETAIL
NOT TO SCALE

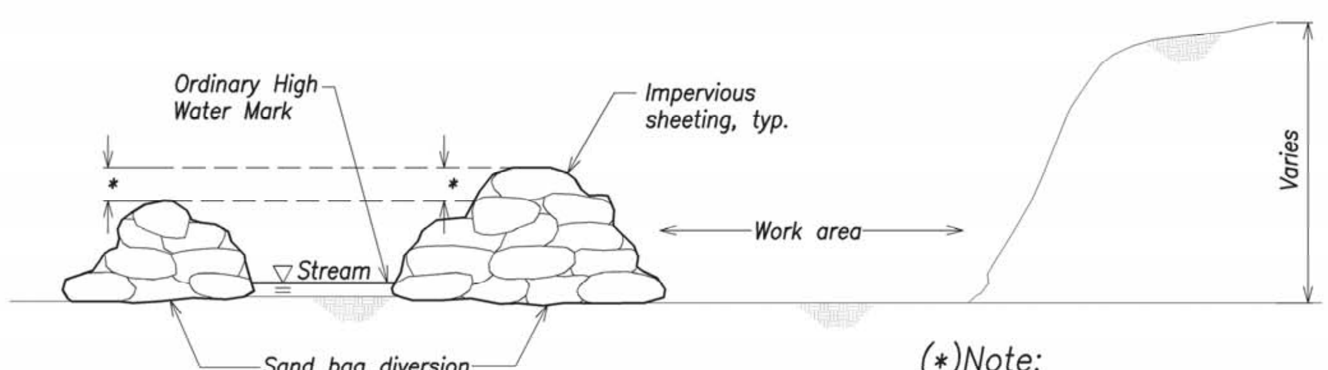


STABILIZED CONSTRUCTION ENTRANCE
Not To Scale



Notes:
1. Riprap shall be basalt rock and consist of 6"ø average stone size, 12"ø maximum stone size.
2. Riprap gradation:
   D_{85} = 9"
   D_{50} = 6"
   D_{15} = 4"
3. 6" Max. from highest adjacent rock finish top.

TEMPORARY DUMPED RIPRAP
Not to Scale



SECTION VIEW

SAND BAG DETAIL
Not To Scale

(*)Note:
Sand bags protecting work area will be constructed 1.5' higher than the opposite side to allow overflow of stream away from work area during high rainfall events.

ORIGINAL PLAN	SURVEY PLOTTED BY			
NOTE BOOK	DRAWN BY / TRACED BY	RST		
	DESIGNED BY	WC		
No.	QUANTITIES BY / CHECKED BY		DATE	

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R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

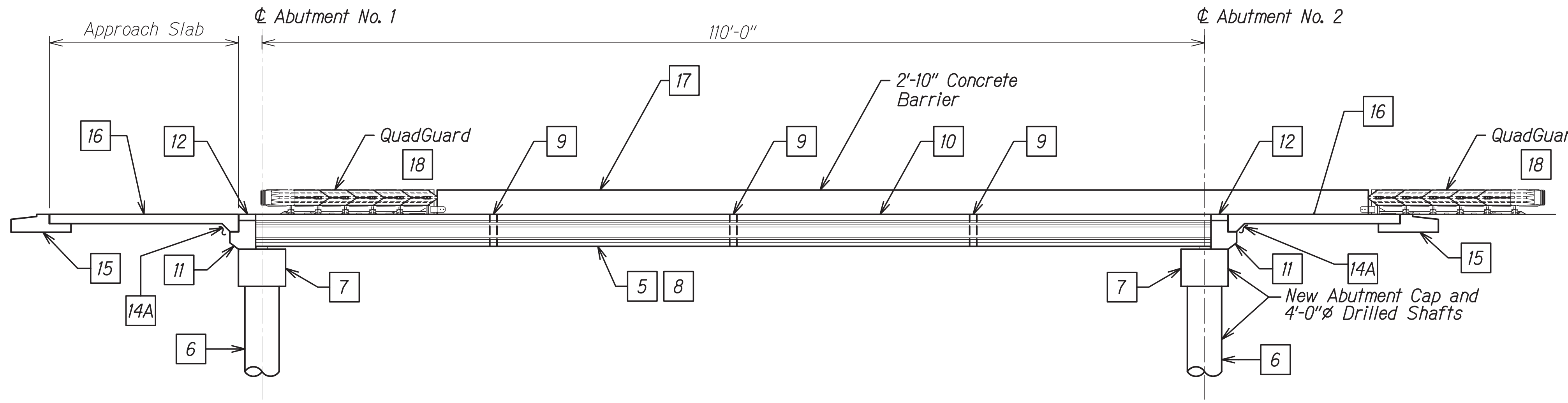
EROSION & SEDIMENT CONTROL DETAILS
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted   Date: April 2015

SHEET No. C-34 OF SHEETS

RMTC JOB NO. : 1-19548-0E

To Kaneohe ← → To Kahuku



CONSTRUCTION SEQUENCE

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

CONSTRUCTION SEQUENCE ELEVATION

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.

LEGEND:

#	Phase 1 Stages

1	Relocate existing utility lines.
2	Construct trial and load test shafts. Perform load test.
3	Install detour road and temporary bridge.
4	Demolish existing bridge.
5	Construct precast girders. (May be done concurrently with Stages 1 through 4.)
6	Construct 4 ft diameter drilled shafts. Shaft numbers 1, 2, 3, 5, 6, 7.
7	Cast Phase 1 drilled shaft cap beams, girder seats, and corbels for concrete encased ducts at least 7 days after the final drilled shaft concrete pour in Stage 6 or until the concrete in Stage 6 has attained a compressive strength of 4,500 psi, whichever occurs later.
8	Erect Phase 1 precast girders at least 15 days after the concrete pour in Stage 7 or until the concrete in Stage 7 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.
9	Construct Phase 1 intermediate diaphragms.
10	Pour Phase 1 cast-in-place deck except areas over end beams and electrical duct encasement.
11	Pour Phase 1 corbel and end beams to top of precast girder at least 30 days after the concrete pour in Stage 10. The concrete pour shall occur between midnight and 3:00 AM (3 hour window).
12	Pour remainder of Phase 1 deck concrete a minimum of 24 hours after the concrete pour in Stage 11.
13	Construct Phase 1 wing walls at least 8 days after the concrete pour in Stage 12 or after the concrete in Stage 12 has attained a compressive strength of 5,000 psi, whichever occurs later.
14A	Backfill to Phase 1 limits and to bottom of approach slab at least 14 days after the concrete pour in Stage 13 or until the concrete in Stage 13 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install concrete encased ducts behind abutments when backfill height is at the elevation of the bottom of the concrete encased electrical ducts. Continue backfilling after concrete for encased electrical ducts has attained its 28 day compressive strength.
14B	Construct barrier wall.
15	Construct Phase 1 sleeper slabs.
16	Construct Phase 1 approach slabs.
17	Construct mauka aesthetic railing, concrete barrier and fence wall.
18	Install mauka quadguards.
19	Install temporary barriers.

STEWART N. WILLIAMS
LICENSED PROFESSIONAL ENGINEER
No. 3908-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

4/30/16

SIGNATURE LIC. EXPIRATION

MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE
PHASE 1

KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

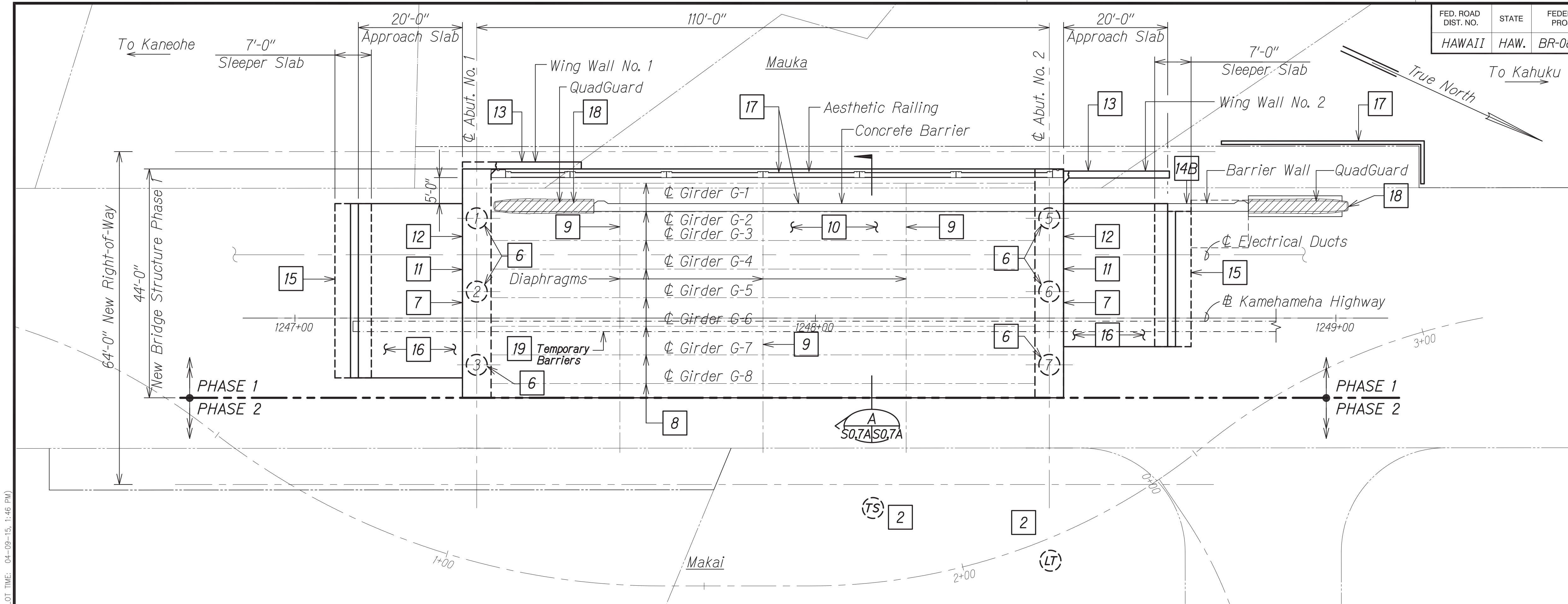
Scale: As Noted Date: April 2015

SHEET No. S0.7 OF 12 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
	QUANTITIES BY	
No.	CHECKED BY	

DRAWING NAME: K:\VERBATIM 12-10-14\BRIDGE\KAI 15-4-8\15-4-9 SW CADD PLOT\---1BI SW CADD 2015-04-10\KSB-S007.DWG PLOT TIME: 04-09-15, 10:52 AM

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	63	148

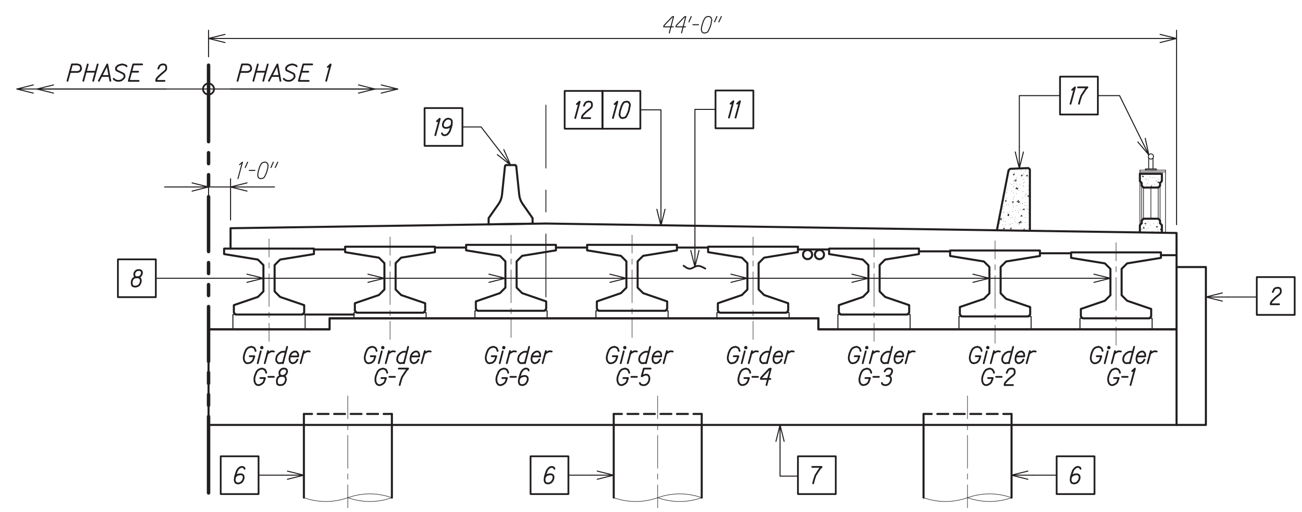


PROPOSED CONSTRUCTION SEQUENCE PLAN (PHASE 1)

Scale: 3/32" = 1'-0"

LEGEND:

- # Construction Sequence Stage
- (#) Drilled Shaft ID
- (TS) Trial Shaft
- (LT) Load Test Shaft



CONSTRUCTION SEQUENCE (PHASE 1)

Scale: 1/4" = 1'-0" A S0.7A S0.7A

STEWART N. WILLIAMS LICENSED PROFESSIONAL ENGINEER No. 3908-S HAWAII, U.S.A.

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4/30/16

SIGNATURE LIC. EXPIRATION

MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE PHASE 1

KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. S0.7A OF 12 SHEETS

ORIGINAL PLAN | NOTE BOOK | No. | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE

DRAWING NAME: K:\VERBATIM 12-10-14\BRIDGE\KAI 15-4-8\15-4-9 SW CADD PLOT\---1BI SW CADD 2015-04-10\KSB-S007A.DWG PLOT TIME: 04-09-15, 1:46 PM

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	64	148

KAIPAPAU STREAM BRIDGE REPLACEMENT – OVERALL CONSTRUCTION SEQUENCE

Structural Construction Stage	Description	References: Civil	References: Electrical	References: Geotech.	References: Structural	Waterline Work	Exist Bridge Open	Detour Open	Detour Off Peak Lane Closures Anticipated	Remarks
Prior to Site Mobilization for Demolition	1. Prior to Site Mobilization, the Contractor shall submit required BMP's and other Municipal and National permit applications as indicated in the project Plans, Special Provisions and Specifications. 2. The Contractor shall submit Prefabricated Steel Beam Bridge Structural Computations and Erection drawings to the Owner for Review and Approval Prior to Fabrication.	Civil Sequence See C-10. See Civil 1			Structural Sequence S0.7,S0.7A, S0.8,S0.8A		Exist Bridge Open to Traffic			
1	1. Install approved BMP measures. 2. Relocate Existing overhead utility lines. 3. Install temporary 12" fusible PVC waterline on existing (upstream) pedestrian walkway.	C-15,16,17, C-20, C-28, see Civil 2	E-8, E-9, E-10, E-11			Temporary 12" fusible PVC waterline				
2	1. Construct Trial and Load Test shafts * 2. Perform Load Test. Demobilize drilled shaft equipment off site.	See Civil 3		Special drilling equipment*	S1.1, S8.3					*Special Provisions Section 511
3	1. Install Detour Pier, Abutments and Temporary Bridge. Construct Civil Phase 1 waterline Improvements C-29; C-30. 2. Construct Detour Approach Retaining Wall, Fills and Roadway – chainlink fence see C-23. 3. Construct Civil Phase 2 waterline improvements–see C-29; C-31.	See Civil 4 C-23, C-29, C-30, C-31, C-32	E-10, E-11, E-15	Excavation Bracing–Spec. Prov. 205*	S12.1, S12.2 S12.3, S12.4 S12.5	Civil Phase 1 & 2 (W16) waterline work–see C-29, C-30.		Detour Open to Traffic		*Excavation Bracing anticipated upstream of detour.
4	1. Relocate existing water line W12 (prior to existing bridge demolition) – see C-20, C-28. 2. Demolish existing bridge.	See Civil 5 C-20, C-28		Excavation Bracing–Spec. Prov. 205*	S2.1, S2.2	Relocate Exist W12 waterline C-20, C-28.	Exist Bridge Demolition			*Exc. Bracing upstream of existing.
5	Construct precast girders. (May be done concurrently with stages 1 through 4.)	See Civil 6			S4.x series					
6	Construct 4 ft. diameter drilled shafts. 1, 2, 3, 5, 6, 7. *			Special drilling equipment*	S1.1,S1.2,S6.1, S6.2,S8.1,S8.2					*Special Provisions Section 511
STRUCTURAL PHASE 1 7	Cast phase 1 drilled shaft cap beams, girder seats, and corbels for concrete encased ducts at least 7 days after the final drilled shaft concrete pour in stage 6 or until the concrete in stage 6 has attained a compressive strength of 4,500 psi, whichever occurs later.			Structure – Excavation Bracing per Spec Prov 205 Required at Makai Limit	S0.7, S0.7A, S6.x series					Marks 7 through 18 are PHASE 1. Structural see 20 for PHASE 2
8	Erect phase 1 precast girders at least 15 days after the concrete pour in stage 7 or until the concrete in stage 7 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.				S0.7, S0.7A, S1.2, S1.3, S6.x series					
9	Construct phase 1 intermediate diaphragms.				S0.7,S0.7A, S5.x series					
10	Pour phase 1 cast-in-place deck except areas over end beams and duct encasement.				S0.7,S0.7A S1.6,S3.1,S3.2					
11	Pour phase 1 end beams to top of precast girder and corbel at least 30 days after the concrete pour in Stage 10. The concrete pour shall occur between midnight and 3:00 AM (3 hours).				S0.7,S0.7A, S6.x series					Concrete Placement At Night
12	Pour remainder of phase 1 deck concrete a minimum of 24 hours after the concrete pour in stage 11.									
13	Construct phase 1 wing walls at least 8 days after the concrete pour in stage 12 or after the concrete in stage 12 has attained a compressive strength of 5,000 psi, whichever occurs later.				S0.7,S0.7A, S7.x series				Lane Closure Duration Approx 3 weeks each abutment with Further Lane Closure Duration Approx 2 weeks each approach	
14	Backfill to phase 1 limits and to bottom of approach slab and at least 14 days after the concrete pour in Stage 13 or until the concrete in Stage 13 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install concrete encased ducts when backfill height is at the elevation of bottom of concrete encased ducts. Continue backfilling after concrete for encased ducts has attained its 28 day compressive strength.		Signal Corps Work E-1, E-5 E-12, E-13, E-16		S0.7,S0.7A,S6.x S9.x					
15	Construct phase 1 sleeper slabs.									
16	Construct phase 1 approach slabs.		Signal Corps Work E-1, E-5 E-12,E-13,E-16							
17	Construct mauka aesthetic railings and concrete barrier.									
18	Install mauka quadguards.									
19	Install Temporary Barriers and Temporary Striping on PHASE I of New Bridge.	See Civil for Barriers								

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed unless authorized in writing by the Engineer.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.
4. Construction shall be conducted such that no construction debris, wash water or other contaminants shall enter the Stream Waters.
5. Closing of the Prefabricated Steel Beam Bridge Structure:
   (a) If for any reason or at any time, the Prefabricated Beam Bridge Structure's ability to safely carry traffic is in question, the Contractor shall be responsible for immediately taking the actions necessary to protect the public by closing, repairing and reopening the Prefabricated Steel Truss Bridge.
   (b) When the Contractor closes the Prefabricated Steel Beam Bridge Structure, the Contractor shall immediately notify the Engineer and the appropriate Law Enforcement Agency.
   (c) Closing of the Prefabricated Steel Beam Bridge shall be included as incidental to Maintenance of Traffic Control.
6. The Contractor shall phase 16 inch waterline (W16) to allow no more than 8 hours of down time. Liquidated Damages of $100,000 per day will be imposed if the Contractor exceeds the 8 hour restriction.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERALL CONSTRUCTION SEQUENCE
STRUCTURAL PHASE 1

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

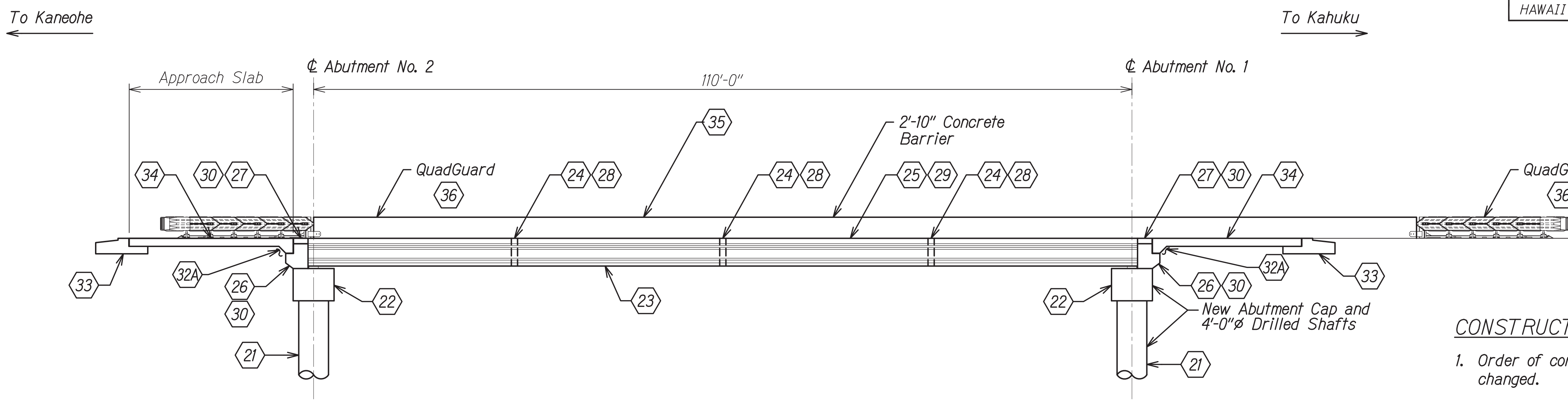
Scale: AS NOTED   Date: April 2015

SHEET No. S0.7B OF 12 SHEETS

ORIGINAL PLAN | NOTE BOOK | No. | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY RSY | QUANTITIES BY WC | CHECKED BY | DATE

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	65	148



CONSTRUCTION SEQUENCE

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

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.

LEGEND:

⟨#⟩ Phase 2 Stages

CONSTRUCTION SEQUENCE ELEVATION

⟨20⟩ Partially remove temporary bridge as required to construct Phase 2 of Kaipapau Stream Bridge

⟨21⟩ Construct 4 ft diameter shafts – Shaft nos. 4 and 8.

⟨22⟩ Cast Phase 2 drilled shaft cap beams, girder seats, and corbels for concrete jacketed waterline at least 7 days after the final drilled shaft concrete pour in Stage 21 or until the concrete in Stage 21 has attained a compressive strength of 4,500 psi, whichever occurs later.

⟨23⟩ Erect Phase 2 precast girders at least 15 days after the concrete pour in Stage 22 or until the concrete in Stage 22 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.

⟨24⟩ Construct Phase 2 intermediate diaphragms between girders G-9 and G-10, install dowels connecting G-10 and G-11, and install W16 with light-weight concrete jacket between girders G-10 and G-11.

⟨25⟩ Pour Phase 2 cast-in-place deck except areas over end beams and closure pour.

⟨26⟩ Pour Phase 2 corbel and end beams (except at closure pour) to top of precast girder at least 30 days after the concrete pour in Stage 25. The concrete pour shall occur between midnight and 3:00 AM (3 hour window).

⟨27⟩ Pour remainder of Phase 2 deck concrete (except at closure pour) a minimum of 24 hours after the concrete pour in Stage 26.

⟨28⟩ Pour Phase 2 intermediate diaphragms between girders G-8 and G-9 at least 4 days after the concrete pour in Stage 27.

⟨29⟩ Pour Phase 2 cast-in-place deck closure except over end beams. Material for cast-in-place deck closure pour shall be VESLMC. (See Special Provisions).

⟨30⟩ Pour Phase 2 corbel and end beam closure from top of drilled shaft cap beam to top of deck. Material for end beam closure pour shall be VESLMC. (See Special Provisions).

⟨31⟩ Construct Phase 2 wing walls at least 8 days after the concrete pour in Stage 30 or after the concrete in Stage 30 has attained a compressive strength of 5,000 psi, whichever occurs later.

⟨32A⟩ Backfill to bottom of approach slab at least 14 days after the concrete pour in Stage 31 or until the concrete in stage 31 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install jacketed waterline behind abutments when backfill height is at the elevation of the bottom of the jacketed waterline. Continue backfilling after concrete for jacketed waterline has attained its 28 day compressive strength.

⟨32B⟩ Construct Barrier Wall.

⟨33⟩ Construct Phase 2 sleeper slabs.

⟨34⟩ Construct Phase 2 approach slabs.

⟨35⟩ Constuct Makai aesthetic railing and concrete barrier.

⟨36⟩ Install Makai quadguards.

⟨37⟩ Remove remainder of temporary bridge.

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE
PHASE 2

KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. S0.8 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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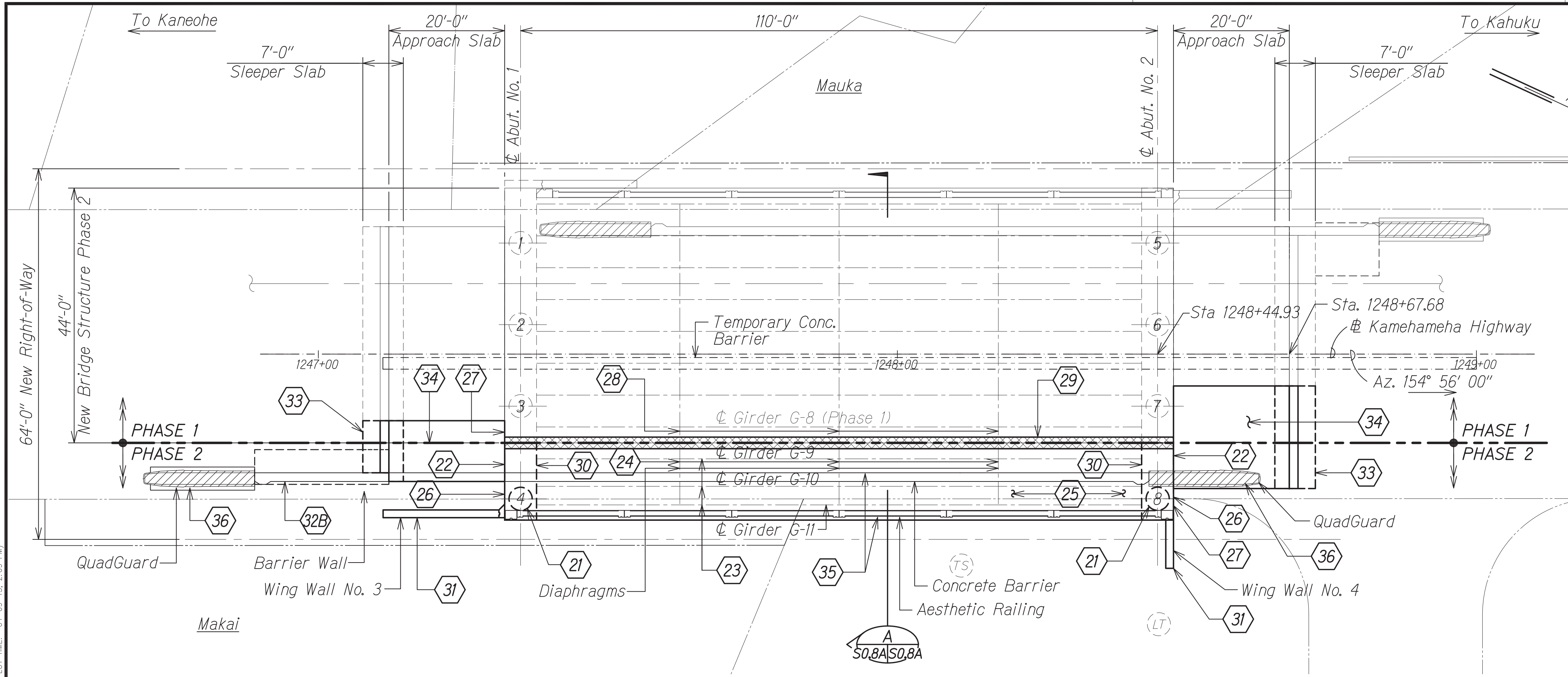
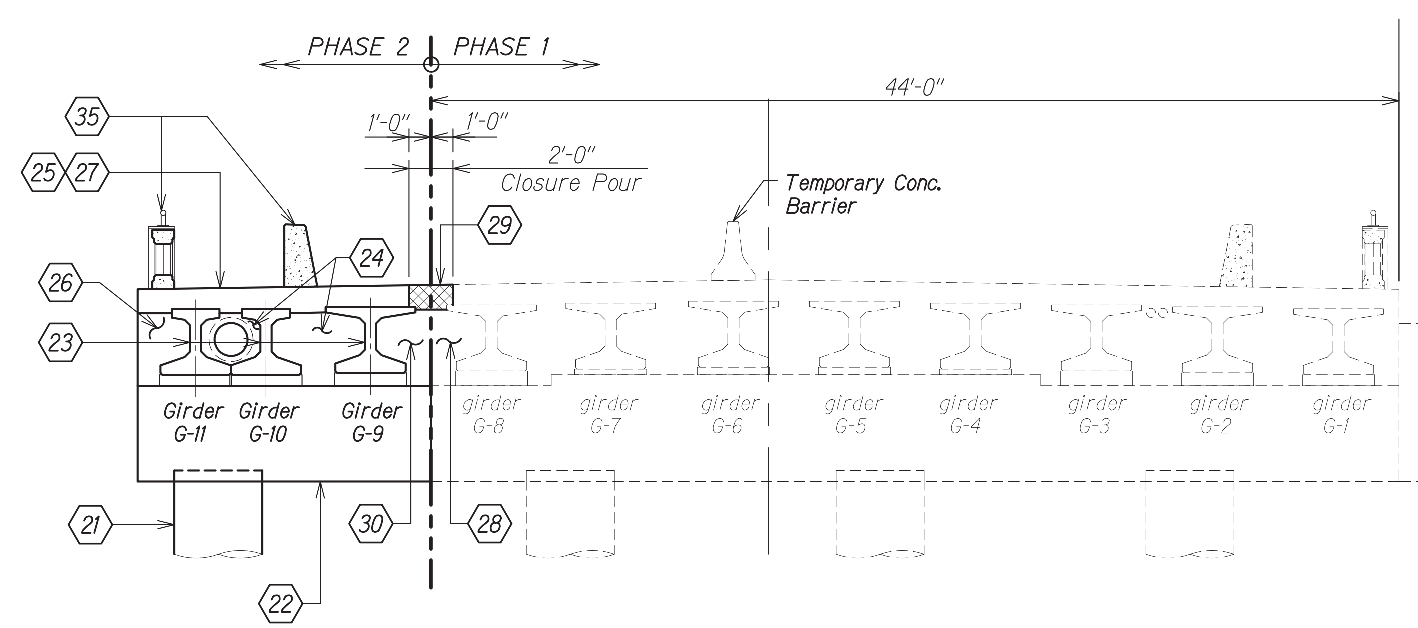


PROPOSED CONSTRUCTION SEQUENCE PLAN (PHASE 2)

Scale: 3/32" = 1'-0"



CONSTRUCTION SEQUENCE (PHASE 2)

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

A S6.3 | S6.3

LEGEND:

- # Construction Sequence Stage
- (#) Drilled Shaft ID
- (TS) Trial Shaft
- (LT) Load Test Shaft
- Closure Pour

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CONSTRUCTION SEQUENCE PHASE 2

KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. S0.8A OF 12 SHEETS

KAIPAPAU STREAM BRIDGE REPLACEMENT – OVERALL CONSTRUCTION SEQUENCE

See Civil 6

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	67	148

Structural Construction Stage		Description	References: Civil	References: Electrical	References: Geotech.	References: Structural	Waterline Work	Exist Bridge Open	Detour Open	Detour Off Peak Lane Closures Anticipated	Remarks
	20	1. Open PHASE I of New Bridge to traffic. Close Temporary Bridge and Detour Roadway to traffic. 2. Remove Mauka portion of Temporary Bridge Only (Remainder to remain in place to support construction equipment for construction of PHASE 2 portion of New Bridge and to support temporary W16 until Final W16 is constructed).				S0.8, S0.8A		PHASE I of New Bridge Open to Traffic to allow Detour Closure	Close Detour and Remove Limited Portion of Temporary Bridge	Not Applicable	Close Detour; Open PHASE 1 of New Bridge: Start Construction of PHASE 2 of New Bridge
STRUCTURAL PHASE 2	21	Construct 4 ft. diameter drilled shafts – Shaft nos. 4 and 8.	See Civil 6		Special drilling equipment*	S1.1, S1.2, S6.1, S6.2, S8.1, S8.2			Detour Closed		*Special Provisions Section 511
	22	Cast Phase 2 drilled shaft cap beams, girder seats, and corbels for concrete jacketed waterline at least 7 days after the final drilled shaft concrete pour in stage 21 or until the concrete in stage 21 has attained a compressive strength of 4,500 psi, whichever occurs later.			Structure Excavation Bracing per Spec for 205 Required at Approaches.	S0.8, S0.8A, S6.x series					Special Provisions Section 205
	23	Erect Phase 2 precast girders at least 15 days after the concrete pour in stage 22 or until the concrete in stage 22 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.				S0.8, S0.8A, S1.2, S1.3, S6.x series	Civil Phase 3 (W16) waterline improvements seeC-29,C32				
	24	Construct Phase 2 intermediate diaphragms between girders G-9 and G-10 and light-weight W16 concrete jacket between girders G-10 and G-11.	C-29, C-30			S0.8,S0.8A, S5.x series					
	25	Pour Phase 2 cast-in-place deck except areas over end beams and closure pour.				S0.8,S0.8A S1.6,S3.1,S3.2					
	26	Pour Phase 2 end beams (except at closure pour) to top of precast girder and corbel at least 30 days after the concrete pour in Stage 25. The concrete pour shall occur between midnight and 3:00 AM (3 hours).				S0.8,S0.8A, S6.x series					Concrete Placement At Night
	27	Pour remainder of Phase 2 deck concrete (except at closure pour) a minimum of 24 hours after the concrete pour in stage 25.									
	28	Pour Phase 2 intermediate diaphragms between girders G-8 and G-9 at least 4 days after the concrete pour in stage 27.									
	29	Pour Phase 2 cast-in-place deck closure except over end beams. Material for cast-in-place deck closure pour shall be VESLMC.									
	30	Pour Phase 2 end beams closure from top of drilled shaft cap beam to top of deck. Material for end beam closure pour shall be VESLMC.									
	31	Construct Phase 2 wing walls at least 8 days after the concrete pour in stage 30 or after the concrete in stage 30 has attained a compressive strength of 5,000 psi, whichever occurs later.				S0.8,S0.8A, S7.x series					
	32	Backfill to bottom of approach slab at least 14 days after the concrete pour in Stage 31 or until the concrete in Stage 31 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install jacketed waterline when backfill height is at the elevation of bottom of the jacketed waterline. Continue backfilling after concrete for jacketed waterline has attained its 28 day compressive strength.				S0.8,S0.8A,S6.x S9.x					
	33	Construct Phase 2 sleeper slabs.									
	34	Construct Phase 2 approach slabs.									
	35	Construct Makai aesthetic railings and concrete barrier.									
	36	Install Makai guadguards. Remove Detour; construct stream hardening. Remove Temporary Barriers at New Bridge. Open Phase 1 and Phase 2 of New Bridge to traffic.	See Civil 7 thru 12	Permanent Electrical Plan See E-12,E-13, E-14			Remove temp W16 at Closed Detour	PHASE I and PHASE 2 of New Bridge Open	Remove Remainder of Detour		

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed unless authorized in writing by the Engineer.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.
4. Construction shall be conducted such that no construction debris, wash water or other contaminants shall enter the Stream Waters.
5. Closing of the Prefabricated Steel Beam Bridge Structure:
   (a) If for any reason or at any time, the Prefabricated Beam Bridge Structure's ability to safely carry traffic is in question, the Contractor shall be responsible for immediately taking the actions necessary to protect the public by closing, repairing and reopening the Prefabricated Steel Truss Bridge.
   (b) When the Contractor closes the Prefabricated Steel Beam Bridge Structure, the Contractor shall immediately notify the Engineer and the appropriate Law Enforcement Agency.
   (c) Closing of the Prefabricated Steel Beam Bridge shall be included as incidental to Maintenance of Traffic Control.
6. The Contractor shall phase 16 inch waterline (W16) to allow no more than 8 hours of down time. Liquidated Damages of $100,000 per day will be imposed if the Contractor exceeds the 8 hour restriction.

ORIGINAL PLAN | NOTE BOOK | No. | SURVEY PLOTTED BY | DRAWN BY RSY | TRACED BY | DESIGNED BY WC | QUANTITIES BY | CHECKED BY | DATE

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERALL CONSTRUCTION SEQUENCE
STRUCTURAL PHASE 2

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: AS NOTED   Date: April 2015

SHEET No. S0.8B OF 12 SHEETS

RMTC JOB NO. : 1-19548-0E

Attachment C

An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawai‘i, by the Federal Highway Administration and Hawai‘i Department of Transportation Practitioners Guide

An Integrated Storm Water Management Approach and a Summary of Clear Water Diversion and Isolation Best Management Practices for Use in the State of Hawaii, by the Federal Highway Administration and Hawaii Department of Transportation

Practitioners Guide

Prepared By:

U.S. Department of Transportation
Federal Highway Administration
Central Federal Lands Highway Division
Lakewood, Colorado

April 2016

Version 1: Draft

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ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Official
BFM	Bonded Fiber Matrix
BMP	Best Management Practice
CCS	Cellular Confinement System
CFLHD	Central Federal Lands Highway Division
CFR	Code of Federal Regulations
CFT	Cross Functional Team
CNPCP	Coastal Nonpoint Pollution Control Program
CWA	Clean Water Act
CWB	Clean Water Branch
CZARA	Coastal Zone Act Reauthorization Amendments
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DLNR	Department of Land and Natural Resources
DOH	Department of Health
DOT	Department of Transportation
DSA	Disturbed Soil Area
EMD	Environmental Management Division
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
ETAP	Environmental Technologies Action Plan
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
FHWA	Federal Highway Administration
FH	Forest Highway
FLAP	Federal Lands Access Program
FLH	Federal Lands Highway
GPS	Global Positioning System
HAR	Hawaii Administrative Rules
HDOT	Hawaii Department of Transportation
HGM	Hydrogeomorphic
HRS	Hawaii Revised Statutes
IWPPP	In Water Pollution Prevention Plan
JD	Jurisdictional Delineation
LEDPA	Least Environmentally Damaging Practicable Alternative
LOP	Letter of Permission
LRR	Land Resource Region
MLRA	Major Land Resource Area
NAEL	National Elk Wildlife Refuge
NHD	National Hydrographic Datum
NPDES	National Pollution Discharge Elimination System
NPS	Non-Point Source
NRCS	Natural Resource Conservation Service
NRPW	Non-Relatively Permanent Water
NWI	National Wetland Inventory
NWPL	National Wetland Plant List
OBL	Obligate
OHWM	Ordinary High Water mark
OP	Office of Planning
PAH	Polycyclic Aromatic Hydrocarbons
PDT	Project Delivery Team
PE	Project Engineer
PEM	Palustrine Emergent
PFO	Palustrine Forested
POC	Pollutants of Concern
PSS	Palustrine Scrub/Shrub
QA	Quality Assurance
QSP	Qualified Stormwater Professional
RE	Resident Engineer
REAP	Rain Event Action Plan
ROW	Right of Way
RPW	Relatively Permanent Water

SR	State Route
SRNF	Six Rivers National Forest
SWANCC	Solid Waste Agency of Northern Cook County
TMDL	Total Maximum Daily Load
TNW	Traditional Navigable Water
TSS	Total Suspended Solids
SDWA	Safe Drinking Water Act
SWPPP	Storm Water Pollution Prevention Plan
UPL	Upland
US	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USGS	United States Geological Service
USFWS	United States Fish and Wildlife Service
UTM	Universal Transverse Mercator
WUS	Waters of the United States
WWB	Wastewater Branch

REFERENCES

The following documents are incorporated by reference:

American Society of Civil Engineers/Environmental and Waters Research Institute (ASCE/EWRI). 2001. Guide for BMP Selection in Urban Developed Areas.

City and County of Honolulu's Department of Environmental Services in cooperation with The General Contractors Association of Hawaii (Honolulu 1999) ; Best Management Practices Manual for Construction Sites in Honolulu, May 1999

City and County of Honolulu's Department of Environmental Services (Honolulu 2011); Stormwater Best Management Practices Manual for Construction, November 2011

California Department of Transportation (Caltrans). 2000; Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, November 2000.

Caltrans. 2003. California Storm Water Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual, March, 2003.

Caltrans. 2003. Construction Site BMP Field Manual and Trouble Shooting Guide. January 2003

Caltrans. 2005. Stormwater Quality Handbooks: Project Planning and Design Guide.

Colorado Water Quality Control Division. 2000. Colorado Regulation Number 82. 5 Code of Colorado Regulations (CCR) 1002-82 401 Certification Regulation, Appendix I: The Selection of Best Management Practices for Clean Water Act 401 Certifications, October 2000

Department of Transportation (FHWA 2014), Federal Highway Administration; Standard Specifications for construction of roads and bridges on Federal Highways projects (FP-14); 2014

Hawaii, Department of Health, Clean Water Branch (DOH-CWB). 2015. Hawai'i's Nonpoint Source Management Plan 2015-2020. Polluted Runoff Control Program. Available at: http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/polluted-runoff-control-program/

Hawaii Department of Transportation (HDOT). 2008. Construction Best Management Practices Field Manual, 2008.

HDOT. 2015a. Storm Water Management Program, Storm Water Permanent Best Management Practices Manual, April 2015.

HDOT. 2015b. Storm Water Management Program, Stormwater Management Program Plan, April 2015

Hawaii, OP. 1996. Hawaii Coastal Zone Management Program. Hawaii's Coastal Nonpoint Pollution Control Program, Management Plan, Volume 1

Hawaii Office of Planning (OP). 2013. Stormwater Impact Assessment: Connecting primary, secondary and cumulative impacts to Hawaii's Environmental Review Process. May 2013.

Hawaii, OP. 2015. Hawai'i's State Land Use System, Informational Briefing Before the Senate Committee on Water and Land, January 28, 2015. Department of Business, Economic Development and Tourism, State of Hawaii Available ate: http://planning.hawaii.gov/

Idaho Department of Transportation (IDOT). 2014. Stormwater Best Management Practices Manuel, January 2014.

Lake Tahoe Regional Planning Agency (Tahoe 2014); Best Management Practices Handbook, May 2014.

Lane, E.W. 1955. The Importance of Fluvial Morphology in Hydraulic Engineering. Proceedings of the American Society of Civil Engineers, Journal of the Hydraulics Division, vol. 81, paper no. 745.

Minnesota Stormwater Manuel. 2005. Version 1; Minnesota Stormwater Steering Committee, November 2005. Available at http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html

National Cooperative Highway research Program (NCHRP). 2006. Evaluation of Best Management Practices and Low Impact Development for Highway Runoff Control.

Oregon Department of Transportation (ODOT). 2008. Memorandum: Stormwater Treatment Progam – BMP Selection Tool. October 22, 2008.

ODOT. 2008. Memorandum: Stormwater Treatment BMP Summary Reports. October 22, 2008.

ODOT. 2008. Memorandum: Water Quality Design Storm Evaluation and Guidance.

ODOT. 2008. Memorandum: Water Quantity (Flow Control) Design Storm Performance Standard.

Portland Water Bureau. 2008. Erosion and Sediment Control Manual

Portland Bureau of Environmental Services. 2006. Effectiveness Evaluation of Best Management Practices for Stormwater Management in Portland, Oregon.

River Corridor Protection and Management FACT SHEET Colorado Water Conservation Board

Sacramento Region Steering Committee. 2014. Stormwater Quality Design Manual, Integrated Design Solutions for Urban Development, Protecting Our Water Quality. May, 2014.

Schumm, S.A. 1984. The Fluvial System. John Wiley and Sons, New York.

Shoemaker, Leslie; Lahlou, Mohammed; Doll, Amy and Patricia Cazenas, 2000, Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring. U.S. Department of Transportation, Federal Highway Administration Publication No. FHWAEP-00-002, Office of Natural Environment, Federal Highway Administration, Washington, D.C. 287p.

United States Army Corps of Engineers. 2016. Pictorial Representations of Jurisdiction. Available at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/juris_info.aspx

United States Department of Agriculture, Natural Resources Conservation Service. 1998. The Practical Streambank Bioengineering Guide, User's Guide for Natural Streambank Stabilization Techniques in the Arid and Semi-Arid Great Basin and Intermountain West.

Water Environment Research Foundation (WERF). International Stormwater BMP Database. (www.bmpdatabase.org).

CHAPTER 1:

1 INTRODUCTION

1.1. PURPOSE

The Federal Highway Administration (FHWA), Central Federal Lands Highway Division (CFLHD) in Partnership with the Hawaii Department of Transportation (HDOT) is proposing updates to improve stormwater management and the implementation of Best Management Practices (BMPs) on their transportation projects in the state of Hawaii.

The purpose of this manual is to provide guidance on common BMPs used in protecting water quality during planning, design and construction activities, with a heavy emphasis on work that is occurring adjacent to, over, or in the boundaries of waters meeting the definition of Waters of the United States (US) (WUS) under the Clean Water Act (30 Code of Federal Regulations [CFR] 328). A key component to successfully accomplish of this goal is an integrated storm water management approach to protecting water quality throughout the life of a project; from project planning and design to after construction completion.

In Hawaii, water is the life blood of the islands and the strong interconnection between precipitation, surface water and ground water is extremely pronounced. Integrated stormwater management is simply thinking about all of the factors that somehow affect this precipitation as it moves from the land surface to an eventual receiving water. It is the process of accounting for all of these factors (e.g. rate, volume, quality, ground water impact) in a logical process so that inadvertent mistakes are not made that could eventually harm a resource. The treatment train approach to stormwater and non-stormwater management mimics this natural sequence as the project design and construction team looks at potential pollutant sources and determines how best to address them, starting with the most basic of solutions and increasing in complexity only if needed, since simple methods of management are often the most practical.

Numerous planning, design, and construction techniques known as BMPs exist to protect natural receiving waters against pollutants commonly associated with the operation, maintenance and construction of transportation facilities. Early consideration of storm water management and BMP alternatives during project design is critical to successful water quality management during construction. The correct selection, installation, and maintenance of BMPs are also paramount in ensuring they effectively treat the pollutants of concern (POC) identified for a particular project.

The purpose of this practitioner guide is to provide regulators, developers, contractors, site managers and inspectors with a guide to an integrated stormwater management approach to project design and construction. Chapter 2 of this guide provides a summary of key components of an integrated stormwater management approach. Chapter 3 provides a BMP Selection Tool through the utilization of preferred BMPs for managing pollutants on transportation construction projects. Improvements in construction techniques and BMP technologies are constantly evolving. Most of the preferred BMPs discussed in this manual have been used effectively by departments of transportation across the country. The BMP Selection Tool provides a transparent and technically based BMP selection process that documents the decisions and streamlines overall the stormwater management process in an effort to improve permitting with the regulatory agencies.

Chapter 4 summarizes the standard construction stormwater and non-stormwater controls BMPs that are commonly implemented on transportation construction projects. This manual builds off of the wealth of available information on the subject of BMPs and proper implementation during construction. The BMPs contained in the Selection Tool do not constitute an exhaustive list of BMPs, but instead provide a summary of common practices utilized for managing pollutants on transportation projects. This manual does not supersede any existing BMP manual for Hawaii instead this manual has incorporated the BMPs included in existing manuals into the stormwater design process. Specifically, all BMPs included in Appendix A (*State of Hawaii (HDOT 2008), Department of Transportation; 2008 Construction Best Management Practices Field Manual*) and Appendix B (*State of Hawaii (HDOT 2015a), Department of Transportation; Storm Water Management Program, 2015 Storm Water Permanent Best Management Practices Manual*) are incorporated into this manual. These appended manuals provide further design details for the individual temporary and permanent BMPs that are commonly incorporated into transportation projects in Hawaii.

Finally, Chapter 5 provides a summary of additional BMPs not included in the before mentioned manuals, but which are commonly utilized for isolating construction from flowing or standing water.

Each additional BMP measure provided in this manual consists of the following:

- General description;
- Applications;
- Standards and Specifications;
- Limitations; and
- Inspections and Maintenance.

The BMPs included in this manual focus on the areas of site management, erosion control, and sediment control during construction including clean water diversion or isolation of a work area from water. They are established practices and procedures to control potential pollutants at their source. These BMPs supplement the standard erosion and sediment control measures included in project plans. Proper installation maintenance and inspection of these BMPs will further help protect Hawaii's valuable water resources from harmful pollutants.

1.1 ACKNOWLEDGEMENTS

Appreciation and acknowledgment is extended to the California Department of Transportation (Caltrans), Idaho Department of Transportation (IDOT), Oregon Department of Transportation (ODOT), The Sacramento Region Stormwater Quality Design Steering Committee and the Lake Tahoe Regional Planning Agency for use of their publications in preparing the information contained in this manual.

This manual was made possible by the combined efforts of many professionals:

- Thomas Parker (Lead), Federal Highway Administration, Central Federal Lands Highway Division, Environmental Protection and Permitting Specialist.
- Nicole Winterton, FHWA-CFLHD, Environmental Protection Specialist.
- Todd Nishioka, Hawaii Department of Transportation

1.2 DISCLAIMER

The information presented in this Practitioners Guide was taken from available and relevant sources deemed to be representative of appropriate BMPs (including clear water diversion and isolation techniques). This manual has been prepared as a reference guideline, however, due to site specific conditions, the selection of the BMPs must be used in conjunction with best professional judgment and sound engineering principles to assure proper function and performance of the BMPs contained herein. The author does not guarantee the accuracy or completeness of this document and will not assume any liability or responsibility for the use of, or for any damages resulting from the use of any information contained herein. The detail and the wording in this manual will not necessarily result in compliance with the appropriate Standard Specifications. Compliance with other requirements such as the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-14), 2005 Hawaii Standard Specifications for Road and Bridge Construction and subsequent changes, Hawaii Administrative Rules (HAR), Chapter 11-54 (Water Quality Standards), and/or HAR, Chapter 11-55 (Water Pollution Control) are deemed the responsibility of the engineer / planner.

The FHWA and HDOT, their employees, contractors, and subcontractors make no warrant, expressed or implied, and assume no legal liability for the information in this manual; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This manual has been prepared by the FHWA and HDOT and endorsed by the Department of Health-Clean Water Branch as voluntary guidance and best management practices (BMPs). The recommendations and protocols discussed in this manual are intended to be suggestions for FHWA and HDOT to use at their discretion. The guidance and BMPs are strictly voluntary and are not intended to implement, replace, duplicate, interpret, amend, or supplement any current statute or regulation. Adherence to the guidance and BMPs does not ensure compliance with any local, state, or federal statute or regulation nor does failure to follow the guidance and BMPs necessarily imply a violation of the National Environmental Policy Act, Hawaii Environmental Policy Act, Clean Water Act, Federal Endangered Species Act or other relevant statutes or legal requirements.

This guide is not intended to be a manual for designing plans and specifications, but a source of information about erosion, sediment, stormwater and non-stormwater control best management practices. The contents should not be interpreted as necessarily representing the policies or recommendations of other referenced agencies or organizations. Refer to state, federal and local regulations and permits for applicable design criteria. For additional detailed design guidance, please refer to the numerous references and manuals listed in the References section of this document. For further reference, see Federal, state and local stormwater and water quality regulations and requirements.

1.3 Scope of this Guide

Water quality can be affected when runoff carries sediment or other pollutants into streams, wetlands, lakes, marine waters and/or into groundwater. Stormwater management can help to reduce these effects. Stormwater management involves careful application of site design principles, construction techniques and source controls to prevent sediment and other pollutants from entering surface or groundwater, treatment of runoff to reduce pollutants, and flow controls to reduce the impact of altered hydrology. This is especially true during the planning, construction and maintenance of clear water diversion and isolation techniques implemented for infrastructure projects.

Numerous Department of Transportations and Stormwater Associations have evaluated and prepared BMP manuals to evaluate their effectiveness. Non-stormwater BMPs including clear water diversion and isolation techniques for construction projects that require work within or around wet areas are especially important given the nature of the work. An understanding of techniques is required to understand the anticipated in-water impacts from construction related erosion and sediment. Construction activities in or near open water can be managed to mitigate risks to water quality through the implementation of these or similar techniques. Technology is always changing, and additional materials, techniques, and products may be developed which expand upon the BMPs referenced within this manual.

1.4 Regulatory Setting

Legal protection of Hawai'i's water resources are guided by federal statutes and state statues and rules. The three primarily federal laws include: the Clean Water Act , the Coastal Zone Management Act, Coastal Zone Act Reauthorization Amendments , and the Safe Drinking Water Act.

1.4.1 Federal Requirements:

1.4.1.1 Clean Water Act

In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the WUS from any point (A point source is any discrete conveyance such as a pipe or a man-made ditch.) unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. This act and its amendments are known today as the Clean Water Act (CWA). Congress has amended the act several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. The following are important CWA sections:

- Sections 303 and 304 require states to issue water quality standards, criteria, and guidelines.
- Section 401 requires an applicant for a federal license or permit to conduct any activity that may result in a discharge to waters of the U.S. to obtain certification from the state that the discharge will comply with other provisions of the act.

This is most frequently required in tandem with a Section 404 permit request (see below).

- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. The Department of Health, Clean Water Branch (DOH-CWB) administers this permitting program in Hawaii. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the United States. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The goal of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

1.4.1.1.1 Waters of the United States

The USACE derives its regulatory authority over potential WUS from two federal laws: 1) Section 10 of the Rivers and Harbors Act of 1899 and 2) Section 404 of the Clean Water Act (CWA) of 1972.

Section 10 of the Rivers and Harbors Act of 1899 prevents unauthorized obstruction or alteration of navigable WUS. Navigable waters are defined as *"subject to the ebb and flow of the tide and/or presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce"* (33 CFR 322.2(a)). A Section 10 permit is required for non-fill discharging activities that would place any structure below, within, or over navigable WUS, or would involve excavation/dredging or deposition of material or any obstruction or alteration in navigable WUS.

The CWA defines WUS subject to agency jurisdiction in 40 CFR 230.3. Under Section 404 of the CWA, dredged and fill material may not be discharged into jurisdictional WUS (including wetlands) without a permit. Wetlands are a subset of jurisdictional WUS and are jointly defined by the USACE and the U.S. Environmental Protection Agency (40 Code of Federal Regulations [CFR] 230.3) as *"those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."*

The USACE issues two types of 404 permits: General and Standard permits. There are two types of General permits: Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of the USACE's Standard permits. There are two types of Standard permits: Individual permits and Letters of Permission. For Standard permits, the USACE decision to approve is based on compliance with U.S. Environmental Protection Agency's (EPA) Section 404 (b)(1) Guidelines (EPA Code of Federal Regulations [CFR] 40 Part 230), and whether the permit approval is in the public interest. The Section

404(b)(1) Guidelines (Guidelines) were developed by the U.S. EPA in conjunction with the USACE, and allow the discharge of dredged or fill material into the jurisdictional waters (i.e. WUS) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA) to the proposed discharge that would have lesser effects on WUS and not have any other significant adverse environmental consequences. According to the Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent (The U.S. EPA defines "effluent" as "wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall.") standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to WUS. In addition, every permit from the USACE, even if not subject to the Section 404(b)(1) Guidelines, must meet general and regional requirements. See 33 CFR 320.4 for general policies for evaluating permit applications. Below in Figure 1 is a graphical depiction of the boundary of WUS under Section 10 of the RHA and Section 404 of the CWA.

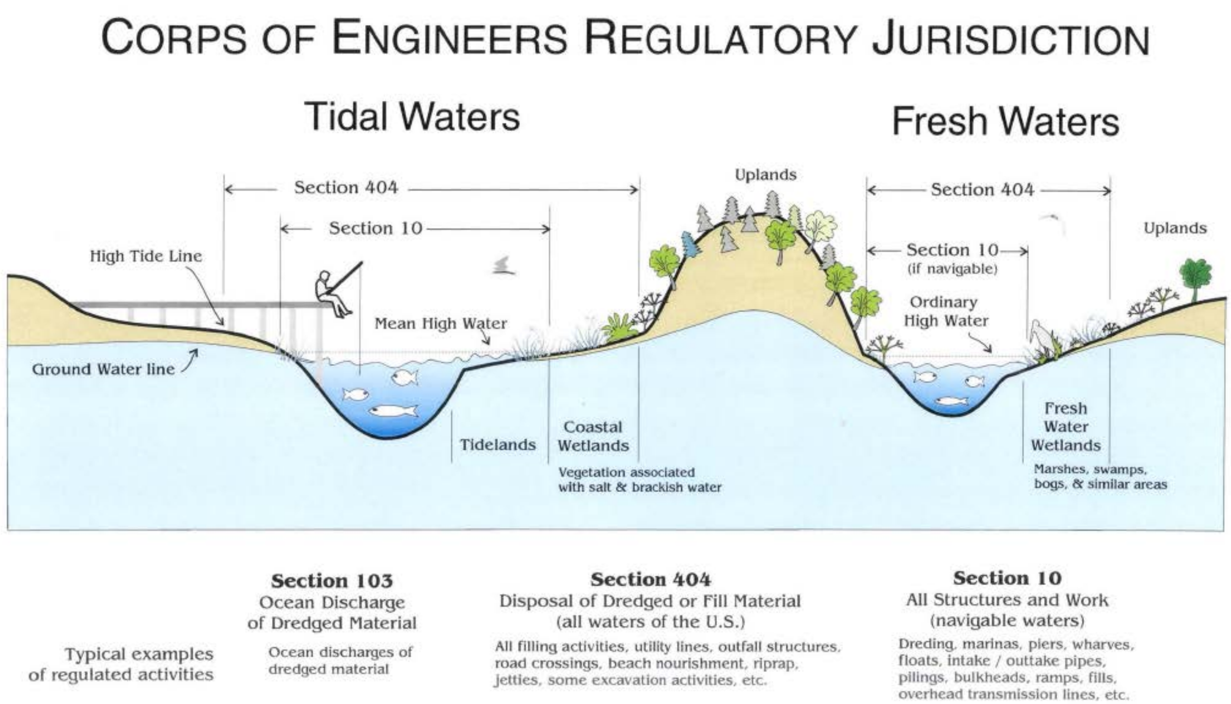


Figure 1. Regulatory Boundaries in Waters of the United States.

1.4.1.2 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) (United States Code (USC) Sections 3501 et seq., as amended in 1990 under the Coastal Zone Act Reauthorization Amendments), administered by the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management, provides for management of the nation's coastal resources and balances economic development with environmental conservation. The national goal for the CZMA program is to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone."

The purpose of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 is to improve the management of the coastal zone and enhance environmental protection of coastal zone resources. Section 6217 of CZARA seeks to address Non-Point Source (NPS) pollution problems in coastal waters by implementing the Coastal Nonpoint Pollution Control Program (CNPCP). The CNPCP is a statewide coastal zone program that establishes and oversees a set of management measures to prevent and reduce NPS pollution from six sources: forestry, agriculture, urban areas, marinas, hydromodifications, and wetlands and riparian areas. The CNPCP also includes a monitoring and tracking condition to ensure that the management measures are being implemented. This program is administered jointly by the EPA and the NOAA.

Section 307 of the CZMA, requires federal agency activities and development projects affecting any coastal use or resource to be undertaken in a manner consistent to the maximum extent practicable with the state's Coastal Zone Management (CZM) program. Also, activities requiring a federal permit or license, and activities conducted with federal financial assistance, that affect coastal uses and resources must be conducted in a manner consistent with the state's CZM program. The CZMA federal consistency provision ensures that federal agencies cannot act without regard for, or in conflict with, state policies that have been officially incorporated into a state's CZM program. Federal actions affecting any coastal use or resource must be reviewed by the state CZM program to ensure that proposed activities are consistent with state enforceable policies.

Section 6217 of CZARA seeks to address NPS pollution problems in coastal waters by implementing the Coastal Nonpoint Pollution Control Program (CNPCP). The CNPCP is a statewide coastal zone program that establishes and oversees a set of management measures to prevent and reduce NPS pollution from six sources: forestry, agriculture, urban areas, marinas, hydromodifications, and wetlands and riparian areas. The CNPCP also includes a monitoring and tracking condition to ensure that the management measures are being implemented. This program is administered jointly by the EPA and the NOAA.

In 1961, Act 187, SLH 1961 Hawai'i's cornerstone state land use law was codified as HRS chapter 205 with the intent to *"preserve, protect, and encourage the development of the lands in the State for those uses to which they are best suited for the public welfare."* The program is administered by the State Land Use Commission and oversees amendments to the state land use districts, designation of important agricultural lands, declaratory rulings, and special permits (>15 acres in agricultural and rural districts).

In 1977, Hawaii enacted HRS Chapter 205A, Hawaii CZM Program, to carry out the State's CZM policies and regulations under the CZMA. The CZM area encompasses the entire State, including all marine waters seaward, to the extent of the State's police power and management authority, including the 12-mile U.S. territorial sea and all archipelagic waters. As a result, all projects in Hawaii are within the CZM area and are subject to consistency with the objectives and policies of the Hawaii CZM Program. The CZM Federal Consistency Certification is reviewed by the State Office of Planning (OP).

The Hawaii CZM Program focuses on ten policy objectives (HRS Chapter 205A):

1. Recreational resources;

(A) Provide coastal recreational opportunities accessible to the public.

2. Historic resources;

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

3. Scenic and open space resources;

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

4. Coastal ecosystems;

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

5. Economic uses;

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

6. Coastal hazards;

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

7. Managing development;

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

8. Public participation;

(A) Stimulate public awareness, education, and participation in coastal management.

9. Beach protection;

(A) Protect beaches for public use and recreation.

10. Marine resources;

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

The Special Management Area (SMA) permit was established in 1975 with the enactment of Act 176, known as the Shoreline Protection Act. The Hawaii legislature in enacting Part II of HRS Chapter 205A found that: *"special controls on developments within an area along the shoreline are necessary to avoid permanent losses of valuable resources and the foreclosure of management options, and to ensure that adequate access, by dedication or other means, to public owned or used beaches, recreation areas, and natural reserves is provided."* Figure 2 below provides a spatial perspective for where the SMA fits within the larger CZM network.

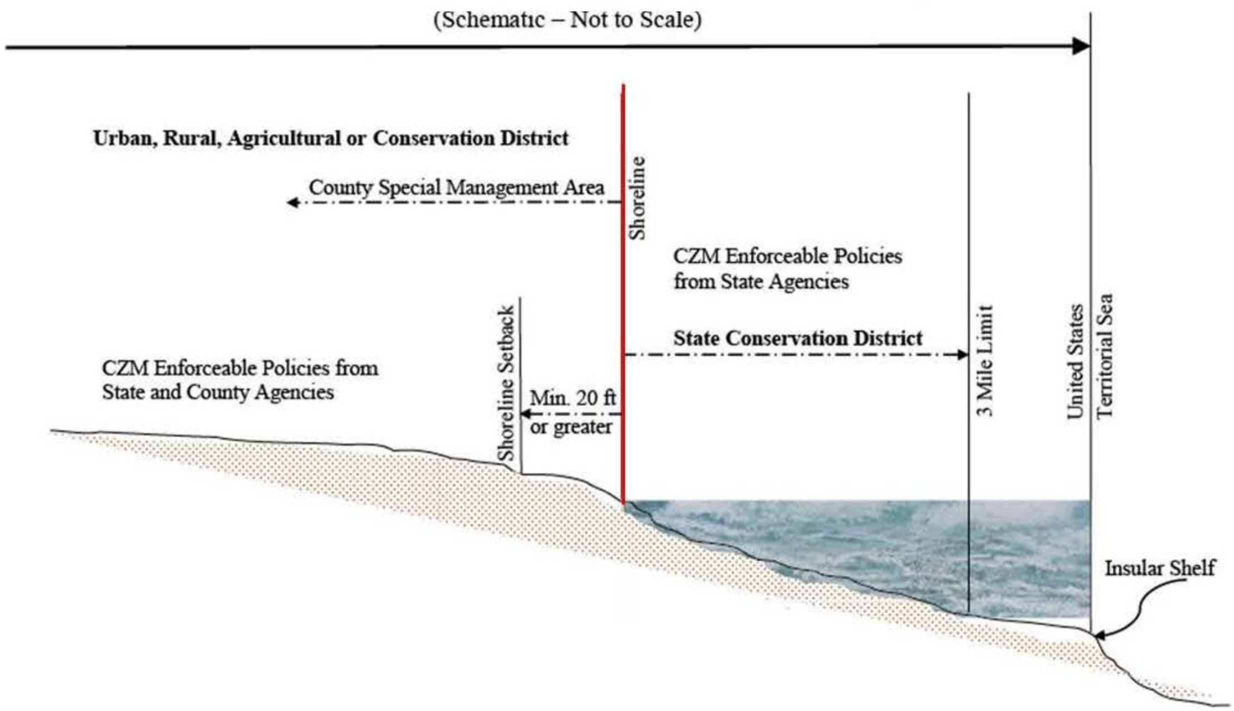


Figure 2. Hawaii CZM Network- A Spatial Perspective.

The Hawaii OP administers HRS Chapter 205A, the CZM law. The purpose of HRS Chapter 205A is to *"provide for the effective management, beneficial use, protection, and development of the Coastal Zone."* The SMA permitting system is part of the CZM Program approved by Federal and State agencies. The SMA permitting system regulates all types of land uses and activities under a broad definition of "development" within the SMA. For an SMA permit approval the proposed action must be determined to be consistent with the CZM objectives and policies, and SMA guidelines or conditions (unless otherwise exempt). The SMA permit must precede any other permit authorization pertaining to an development within the SMA (HRS 205A 28 and 29). Some such SMA conditions may include:

- Provision of public shoreline access;
- Preservation of important archaeological sites;
- Building height restrictions;
- Boundary setback requirements to preserve coastal views from public access;
- Drainage improvements to mitigate flooding or to control siltation in coastal waters.

The shoreline setback boundaries have been established to conserve open space, minimize interference with natural shoreline processes; and minimize loss of improvements due to erosion (HRS § 205A-2(c)(9)(A)). The shoreline certification process was created to establish a baseline from which each County (utilizing its regulations) can measure the start of the "no build zone". This boundary is determined in the field utilizing survey techniques. The Department of Land and Natural Resources (DLNR) looks at the vegetation line and debris line along the shoreline though other types of evidence such as elevation, salt deposits, rock coloration, and other geomorphologic indicators, biological indicators, neighboring shorelines, anecdotal evidence provided by people familiar with the area, and evaluation of seasonal wave run-up statistics and models may be utilized.

1.4.1.3 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA), which was originally passed in 1974, protects public health by regulating the nation's drinking water supply. It is administered by the EPA and implemented by the DOH Safe Drinking Water Branch (SDWB). The SDWB is responsible for protecting the State's drinking water resources, including both surface and groundwater sources, and ensures that public water systems meet federal and state health-related standards for drinking water. The DOH's Wastewater Branch (WWB) is also responsible for protecting drinking water and public health by ensuring that the use and disposal of wastewater does not contaminate water sources.

1.4.1.4 Endangered Species Act

The purpose of the Endangered Species Act (ESA) is to protect and promote recovery of imperiled species and the ecosystems upon which they depend. The federal ESA is administered by NOAA Fisheries Service for marine mammal species and anadromous species. USFWS administers the ESA for freshwater fish species, and for birds, mammals, reptiles, amphibians, invertebrates, and plants.

Three provisions of the ESA may apply directly to stormwater management: Section 4(d) rules, Section 7 consultations and Section 10 habitat conservation plans.

Section 4(d) of the ESA requires USFWS or NOAA Fisheries Service to implement protective measures that prevent further damage to threatened species. Section 4(d) applies only to threatened species; endangered species are afforded full legal protection without room for maneuvering. "Take" of any species listed as endangered is prohibited by the ESA. Take of threatened species may be allowable under permit, provided project-related take does not interfere with species survival or recovery.

ESA compliance involves determination of effect on listed species, and may lead to consultation with USFWS/NOAA Fisheries Service under Section 7.

1.4.1.5 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary law governing marine fisheries management in U.S. Federal waters. It establishes a national program for the conservation and management of the fishery resources of the United States to prevent overfishing, rebuild overfished stocks, ensure conservation, facilitate long-term protection of essential fish habitats (EFH), and realize the full potential of the Nation's fisheries. In accordance with Section 305(b) of the MSA, Funding Agencies must consult with NOAA's NMFS regarding any of their actions authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken that may adversely affect EFH. For additional guidance, please view the EFH Regulatory Guidelines (http://www.habitat.noaa.gov/pdf/efhregulatoryguidelines.pdf).

1.4.2 State Requirements:

The state statutes and rules governing water quality are captured in the Hawai'i Revised Statutes (HRS) and the Hawai'i Administrative Rules (HAR).

Water quality management in Hawai'i is guided by the State Water Code (HRS Chapter 174C) and the Hawai'i Water Plan. The Hawai'i Water Plan serves as a framework for comprehensive water resource planning to address the State's water quantity and quality issues. Specifically, it sets forth an integrated and coordinated approach to managing the State's waters and consists of plans prepared and implemented by the State DOH, the DLNR, the Department of Agriculture (HDOA), and the four counties of Hawaii. These agencies and their respective plans address the State's water protection policies, water quality, water needs, and sustainable water use. DLNR's Water Resource Protection Plan and DOH's Water Quality Plan provide the overall legal and policy framework that guides the development, conservation, and use of water resources. DLNR's State Water Projects Plan and HDOA's Agricultural Water Use and Development Plan provide guidance for the State's agricultural water needs and development. The information from these plans is integrated into County Water Use and Development Plans, which set forth the broad allocation of water use within each county.

The DOH Environmental Management Division (EMD) establishes the State's water quality standards and is the lead agency responsible for protecting the State's surface and groundwater quality. The EMD administers the State's surface water and groundwater quality assessment, management, permitting, and enforcement programs through the Clean Water Branch (CWB), the Safe Drinking Water Branch (SDWB), and the Wastewater Branch (WWB).

The DOH-CWB is responsible for implementing the Surface Water Quality Management Program for recreational and ecosystem protection. This is accomplished through a coordinated approach that includes water quality monitoring and assessment, engineering and permitting, water quality violation enforcement, and polluted runoff control management.

Pursuant to the CWA and HRS Chapter 342D, HAR Chapter 11-54 (Water Quality Standards) establishes Hawai'i's water quality standards, including limits for conventional and toxic pollutants. Chapter 11-54 also classifies the State's water bodies and prohibits unauthorized discharges from both point source and NPS in inland and marine waters. HAR Chapter 11-55 (Water Pollution Control) provides for the prevention, abatement, and control of new and existing water pollution, primarily through permitting and permit compliance. Chapters 11-54 and 11-55 are administered by the CWB and are reviewed and amended every three years or as needed.

Sections 305(b) and 303(d) of the CWA drive Hawai'i's surface water quality assessment efforts. Under Section 305(b), the State is required to assess, characterize, and report the quality of its surface waters every two years. Under Section 303(d), the State identifies impaired waters and develops Total Maximum Daily Loads (TMDLs) to address these impairments. Impaired waters do not meet the State's numeric water quality criteria, which are governed by HAR Chapter 11-54. The State of Hawai'i Water Quality Monitoring and Assessment Report, known as the Integrated Report, addresses 305(b) and 303(d) requirements and is submitted to the EPA and U.S. Congress by the DOH-CWB every two years. The DOH CWB Monitoring and Analysis Section is responsible for monitoring State surface waters, updating water quality standards, conducting assessments for the 303(d) list of impaired waters and the 305(b) report, and developing TMDLs.

The Hawai'i counties may also become involved in the management of CWA resources through the implementation of their grading ordinances and other permit or approval processes. One county, the City and County of Honolulu, has incorporated into its SMA ordinance (Chapter 25, ROH, "Shoreline Management") provisions for wetland protection in the permitting process, and for rulemaking and enforcement pertaining to the conservation, protection, and restoration of wetlands.

1.4.2.1 National Pollutant Discharge Elimination System (NPDES) Program

The Hawai'i legislature enacted HRS Chapter 342D (Water Pollution) and Chapter 342E (NPS Pollution Management and Control) to address point source and NPS water pollution in the State. HRS Chapter 342D is Hawai'i's equivalent to the CWA and states that *"[n]o person, including any public body, shall discharge any water pollutant to state waters, or cause or allow any water pollutant to enter state waters except in compliance with this chapter, rules adopted pursuant to this chapter, or a permit or variance issued by the director [of the DOH]."* Under Chapter 342D, the DOH has the authority to administer, enforce, and carry out all laws, rules, and programs relating to both point source and NPS pollution.

1.4.2.1.1 Municipal Separate Storm Sewer Systems (MS4)

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of storm water discharges including:

A. A discharge with respect to which a permit has been issued under this section before February 4, 1987.

B. A discharge associated with industrial activity.

C. A discharge from a municipal separate storm sewer system serving a population of 250,000 or more.

D. A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000.

E. A discharge for which the Administrator or the State, as the case may be, determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to WUS.

An MS4 is defined as *"any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that is designed or used for collecting or conveying storm water."* Currently in O'ahu and Maui counties, a portion of urban runoff is controlled through NPDES MS4 permits. MS4 permits require these counties to develop and implement stormwater management program plans, which include pollution prevention measures. The CNPCP also devotes several management measures to the prevention and reduction of pollution generated by development and maintenance of roads, highways, bridges, and facilities in urban areas.

1.4.2.1.2 Construction General Permit

The DOH-CWB amended HAR, Chapter 11-55 and readopted the NPDES General Permits in HAR, Chapter 11-55 (Appendices A through L). These NPDES General Permits, became effective on December 6, 2013. The NPDES General Permit in Appendices B through L cover numerous discharges of stormwater from various construction and operational activities., The permit regulates storm water discharges from construction sites that result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a larger common plan of development. By law, all storm water discharges associated with construction activity where clearing, grading, and excavation result in soil disturbance of at least one acre must comply with the provisions of the Construction General Permit. A construction activity that results in soil disturbances of less than one acre is subject to this Construction General Permit if there is potential for significant water quality impairment resulting from the activity as determined by the DOH-CWB. Operators of regulated construction sites are required to develop storm water pollution prevention plans (SWPPP); to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the Construction General Permit.

FHWA and/or HDOT, as the agency responsible for construction management and oversight for transportation projects, are responsible for obtaining the NPDES permit and for signing certification statements (when necessary). FHWA and/or HDOT are also responsible for ensuring that all permit conditions are included in the construction contract and fully implemented in the field during construction.

1.4.2.2 Section 401 Water Quality Certification Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the United States must obtain a 401 Certification, which certifies that the project will be in compliance with state water quality standards. The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by the USACE. The 401 permit certifications are obtained from the DOH-CWB, dependent on the project location, and are generally required before the USACE issues a 404 permit.

In some cases, the DOH-CWB may have specific concerns with discharges associated with a project. As a result, the DOH-CWB may issue a set of requirements that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. These requirements can be issued to address both permanent and temporary discharges associated with a project.

1.5 Considerations for Working in Riverine Systems

Rivers, Streams, drainages, gulches and other aspects of the riverine systems involve complex processes that do complicated work. In their natural state, streams gather, store, and move water. However, it is important for understanding stream processes to realize that streams and rivers are not only moving water (streams also move sediment, nutrients, and woody debris from mountain peaks to the sea).

Human land uses that significantly alter the ability of a creek to transport water and sediment will likely cause a stream to become unstable and increase the likelihood that catastrophic erosion or sedimentation may occur during a flood event. The relationship between water in a stream and its ability to transport sediment is shown as a balancing scale (Figure 3). When any one or more of the variables of this scale change, the system is no longer in balance, and aggradation or degradation of the river/stream bed and banks may occur. Given time and freedom to make adjustments, a stream will adjust its slope and sediment transport capability toward an equilibrium condition.

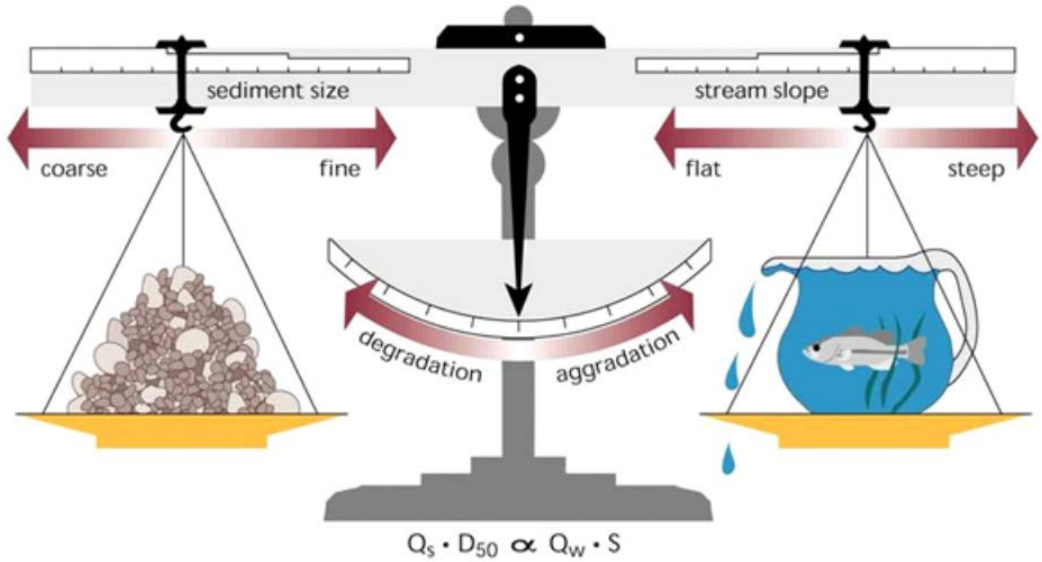


Figure 3: Lane's Balance of Sediment Supply & Sediment Size with Slope (energy grade) & Discharge

Throughout North America, river scientists and managers are now bringing this principle of river "stability" into the management of river channels by recognizing that stable rivers carry water, sediment and debris, even during high water, without drastic changes occurring in the depth, width, length, or slope of the channel. The term "dynamic equilibrium" is often used to describe a naturally stable stream channel. The channel may shift its location over time but ultimately will maintain consistent dimensions and habitat values. Channels remain stable when they are not impeded by unnatural constrictions like undersized transportation structures such as bridges and culverts and have access to a vegetated floodplain. When development changes the relationship of the river with its floodplain or alters the ability of a channel to transport its water and sediment load, it becomes increasingly difficult to protect this infrastructure.

Fluvial (river-related) erosion refers to streambed and streambank erosion associated with the sudden and catastrophic physical adjustment of stream channel dimensions (width and depth) and location that can occur during elevated discharges. Much of this damage occurs where rivers and streams have been separated from their floodplains by some kind of development (either temporarily or permanently) thus concentrating erosive energy within the channel. Other examples are where rivers are unable to transport their sediment due to a constriction in the channel (e.g. culvert, weir, diversion structure, road embankment) which creates a sediment deficit downstream, or where excessive inputs (e.g. massive soil erosion from a burn or landslide scar) build up the river bed and exacerbate overbank flows. In these instances, a stream is likely to become destabilized and is more prone to sudden lateral or vertical shifting which may produce unexpected consequences for surrounding landowners. The dollar cost of such damage may well be equaled by other economic losses including diminished recreation opportunities, impaired ecological functions, and long-term channel instability.

Cutting a river off from its floodplain by building levees, berms and roadways, armoring with stone, or dredging a channel will cause a river to adjust through physical change. The result of containing greater flows in the channel (i.e., preventing access to the floodplain) is to increase the erosive power (friction) that must be resisted by the channel boundary materials; i.e., the rocks, soil, vegetation, or manmade structures that make up the bed and banks of the river. Figure 4 shows a common scenario of channel evolution process as described by Stanley Schumm (1984). It is important to note that this diagram only illustrates channel response at one location. There are equally profound physical adjustments that occur upstream and downstream from the site of a river corridor alteration as bed degradation (head cuts) migrate up through the system and aggradation in the form of sedimentation occurs downstream. Similarly another common form of channel evolution may occur where a stream starts in a stable condition but is overloaded with sediment from upstream sources and quickly aggrades (i.e. fills in) its channel spilling out onto the surrounding floodplain with significant destructive potential.

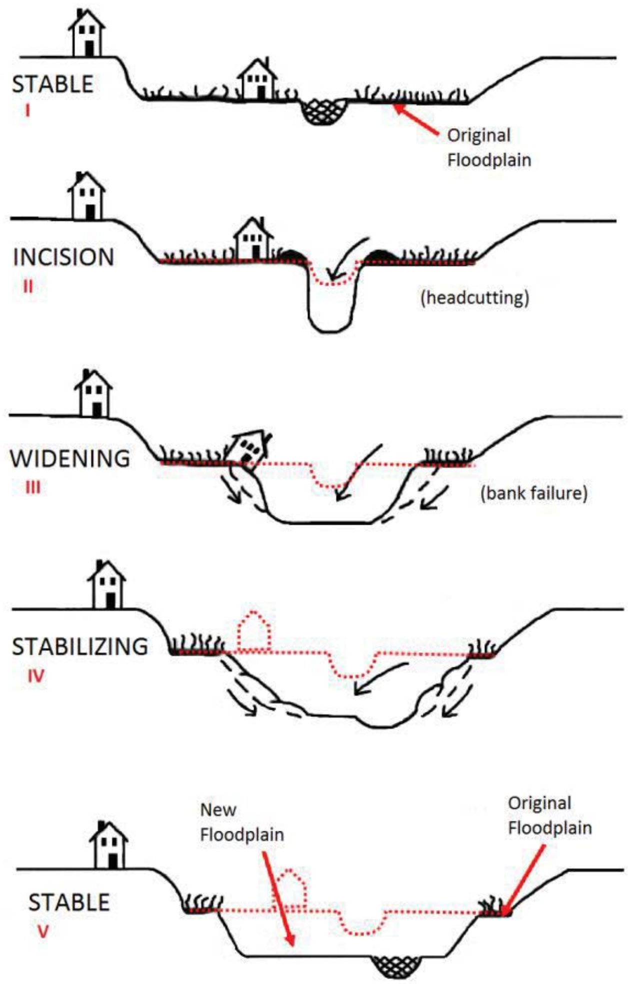


Figure 4: Channel Evolution Process (Source: Schumm, S., 1984).

Understanding fluvial processes is paramount when designing transportation infrastructure that must border, cross, or interact with a riverine system. It is important to recognize the temporal aspect of channel response to change. Fluvial systems are energized by episodic events. Channel adjustment in response to management practices or encroachments may take effect immediately but may also persist for decades depending on the sensitivity and morphology of the stream channel, the magnitude of alteration, and the frequency of high flow events. Consideration of these processes and efforts to maintain stable channel dimension and access to riverine floodplains should be considered during design of permanent and temporary transportation structures within the riverine system.

1.6 The Riparian Zone

Riparian areas are unique vegetation communities that occur adjacent to waterways and wetlands, and provide habitat for numerous floral and faunal species. They generally occupy transitional areas between aquatic and upland habitats, and may function as vegetative buffers for aquatic resources. The riparian zone can be rich with diversity os plant species occupying several vegetative layers. Riparian vegetation composition and structure is regulated by: (1) frequency, magnitude, duration, and seasonal timing of stream flooding and (2) subsurface moisture conditions.

The condition of the riparian zone adjacent to streams has a critical impact on water quality. Permanent and deeply rooted stream bank vegetation slows run-off of nutrients and pollutants, reduces sedimentation and solar heating, provides wildlife habitat, and overhead cover and organic food supply for aquatic species. Riparian areas typically do not satisfy the USACE regulatory definitions for wetlands (i.e. hydrophytic vegetation, hydric soils, and hydrology) and frequently occur in locations transitional between these jurisdictional wetlands and adjoining uplands. However, riparian areas perform many of the same functions as do wetlands, including maintenance of water quality, storage of floodwaters, and enhancement of biodiversity. Although riparian habitats are often combined with wetlands (as a result of their intimate relationship to the hydrological regime), riparian areas differ from wetlands in that they are generally linear, more terrestrial (less hydric), and are often dependent on a natural disturbance regime relating to flooding and stream dynamics. Figure 5 depicts a conceptual riparian cross section.

In Hawai'i, the coastal nonpoint pollution control program has defined the Hawaii Riparian Zone as *Vegetated ecosystems along a waterbody through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent waterbody. These systems encompass wetlands, uplands, or some combination of these two land forms. They will not in all cases have all of the characteristics necessary for them to be classified as wetlands.*

A healthy riparian zone provides many important benefits including:

- Water Quality Protection;
- Flood Control;
- Streamflow Maintenance;
- Water Temperature;
- Wildlife Habitat;
- Recreation Benefits; and
- Economic Benefits

Riparian vegetation intercepts surface runoff and associated pollutants (sediment, nitrogen, phosphorous, pesticides, heavy metal, etc.) and can buffer their effects on water quality. Loss of riparian areas reduce water quality values, faunal populations, and can result in property damage or loss of lands from bank erosion. Removal of riparian vegetation results in increased water temperatures and decreased dissolved oxygen. The loss of shade exposes soils to drying out by wind and sunlight and reduces the water storage capacity of the riparian area. Loss of riparian vegetation causes streambank erosion. The riparian zone should be considered during project design and efforts made to promote riparian function in project design. Suitable riparian buffer widths are highly variable and are dependent on several variables including slope, soil type, and vegetation mix.

Riparian area health and streambank stability are simply a reflection of the conditions in the surrounding landscape. When studying the river, stream, gulch in your project area, it is important to keep in mind that extensive stretches of eroding streambanks are only symptoms of an unhealthy system and are not the true cause of the problems.

Healthy streams and riparian areas are naturally resilient which allows them to accommodate and recover from natural disturbances such as flood events. Streambank stability is a function of a healthy riparian area. When the riparian area is degraded, the stream health will often degrade in kind and its resiliency to natural disturbances will diminish. Excessive flooding, erosion, and sedimentation will often increase. Degraded riparian areas are less effective for storing floodwaters. As more sediment is deposited, water quality is also diminished. High levels of sediment in a stream suffocate fish, fill in spawning areas and pools, and kill aquatic invertebrates.

As additional sediment is deposited in streams, the streambed may aggrade and become shallower, forcing water to spread out and cause bank erosion. Eroding banks contribute to sedimentation and lead to a wide shallow stream with little habitat value. These factors result in significant reductions in aquatic stream life. Excessive bank erosion causes wider, shallower channels and lowers the water table. A shallower stream also has a lower dissolved oxygen content and a higher temperature, which supports less aquatic life.

In other streams, headcutting may occur, which is the cutting of the streambed to a lower bed elevation. As the streambed lowers, the water table also lowers. This causes riparian vegetation to die-off and be replaced with upland vegetation, which is less successful in stabilizing the streambank. In either case, headcutting or aggradation of the streambed greatly diminishes the natural resiliency of riparian areas.

The first step to designing a transportation project within the riparian zone is to determine the best way to find ways to promote riparian functions while still meeting project needs. By doing so, mitigation for project impacts to aquatic resources can often be completed in close proximity to project impacts. While preservation and conservation of healthy streams and riparian areas should receive high priority, it is clear that restoration of degraded areas is also equally as necessary during the construction of transportation projects.

Prior to roadway construction, rivers and streams generally meandered back and forth along smooth, sinuous paths, with well establish floodplains; the width of these meanders and floodplains varying primarily due to valley slope. However, when man-made structures such as bridges and culverts are placed along stream channels, this natural pattern is interrupted as the streams are forced to flow around tight bends or through narrow constrictions. Quite often, these impacts are unavoidable to meet the transportation needs. Protection of the roadway is usually accomplished through solely traditional engineering practices. Alternatively utilizing solely natural stream/channel design on projects is impracticable due to design requirements. Sometimes plants fail to grow or are replaced by invasive species. Plants and other natural components are harder to model for stability due to buoyancy, decomposition, and other factors. Plants and other natural components may be subject to scouring. Plants can also be uprooted by freezing and thawing, flood flows, and debris loads. Livestock and wildlife often feed on the plants and may destroy them. Because of these variables, utilizing solely bioengineering practices may require the project to receive more frequent maintenance for a period of time, especially early in the project life until vegetation reaches maturity.

However, traditional roadway design principles can be partnered with appropriate bioengineering practices to improve synergy between the roadway and riparian systems. See Streambank Stabilization BMP in Chapter 5 for more details. Common bioengineering principles that can be evaluated include:

- Fiberschines
- Brush Mattress
- Brush Layering
- Stake Plantings
- Pole Plantings
- Post Plantings
- Brush/Tree Revetment
- Brush Trench
- Vertical Bundles
- Live Wattles or Fascines
- Rootwad Installation
- Living Cribwalls
- Engineered Log Jams
- Boulder Revetments
- Rock Toe Revetments
- Rock/Log Vanes
- Rock/Log Weirs
- Erosion Control Fabric
- Etcetera!!!

1.6.1 Practices to Promote

- Protect or establish native or non-invasive shrubs, trees, or other vegetation along streams to help prevent bank erosion, trap sediment and filter other pollutants.
- Maximize riparian buffer width while balancing sociologic and economic constraints
- Consider riparian functions during project design. Plan land disturbing activities to protect riparian zones.
- Integrate bioengineering concepts where practicable.

1.6.2 Practices to Avoid

- Straightening sections of streams.
- Removing streamside shrubs, trees and other vegetation.
- Excessive hard armoring in riparian zone including the stream channel. [

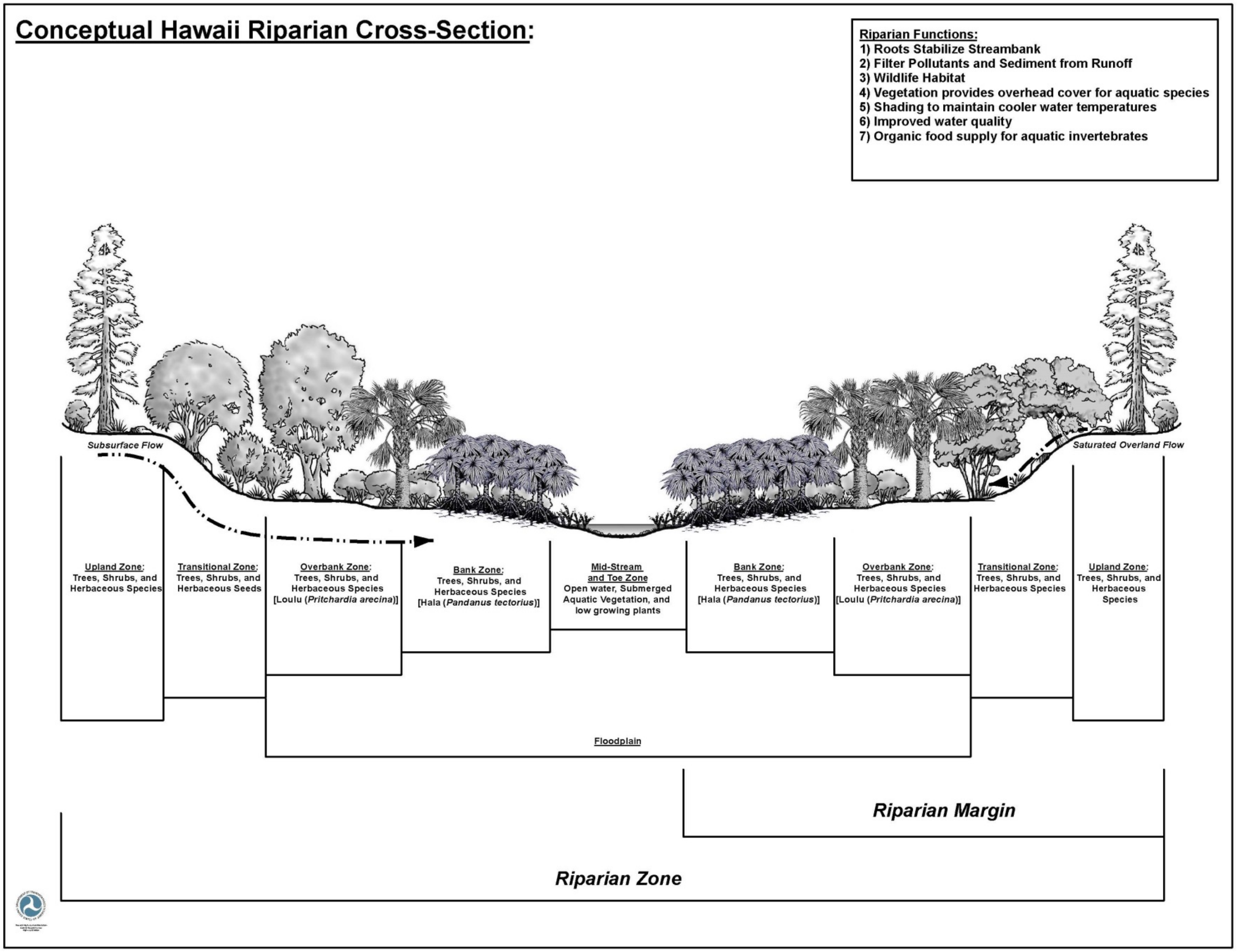


Figure 5: Conceptual Riparian Cross Section

CHAPTER 2:

2 INTEGRATED APPROACH TO STORMWATER MANAGEMENT

In order for site designs to reflect the best stormwater management strategies, it is essential that stormwater be considered early in the site design process—before the site layout is established. Otherwise, the choice/location of stormwater controls will be constrained by prior site design decisions (e.g., predetermined grading contours), and may be limited to more expensive, higher maintenance, and less aesthetically pleasing options.

When stormwater controls are considered early, they can be effectively integrated into site design and planning. There are often opportunities to use existing or proposed site features for stormwater controls and/or repeat small-scale stormwater controls over an entire site. Small-scale controls are typically low-cost and cumulatively very effective.

In some cases, site design necessitates trade-offs among competing goals; however, especially when considered early in the process, stormwater goals can often complement other goals and agency requirements, including those related to vegetation preservation, landscaping, aesthetics, open space, recreational areas, and/or habitat.

2.1 STRATEGIES FOR STORMWATER QUALITY MANAGEMENT INTO PROJECT DEVELOPMENT

2.1.1 ASSEMBLE A COLLABORATIVE TEAM EARLY

In order for site designs to reflect the best stormwater management strategies, stormwater controls must be considered early in the site design process. To do that, involve the project engineer and other design professionals during the conceptual design stage, when the initial site layout is being determined. In the past, only planners and architects may have been involved at this stage of the design.

The collaborative design process may involve the following members of the Project Delivery Team (PDT) or Cross Functional Team (CFT):

- Project Owner
- Project Manager
- Planners
- Designers
- Engineers (Civil, Geotechnical, Etcetera.)
- Hydrologists
- Surveyors
- Landscape Architects
- Arborists
- Environmental Consultants
- Landscape Architects
- Land Management Agencies
- Permitting Agency Staff

It is also helpful to arrange a meeting with the local permitting agency to get agency input at the conceptual design stage; in most jurisdictions, this is referred to as the pre-application meeting.

It is equally important that those involved in site planning and design work collaborate throughout the site design process; that way, stormwater quality features can be optimally integrated into the site and project design. This might be facilitated by periodic meetings of the project team and by routing various designs to the different disciplines for review and comment.

2.1.2 Consider the Site and its Surroundings

Gather information about the following site characteristics, which will greatly influence the type of stormwater quality controls used on your project:

- Climatic region and terrain may lead to design modifications or BMP preferences
- Existing natural hydrologic features and natural resources, including any contiguous natural areas, wetlands, watercourses, seeps, or springs.
- Existing site topography, including contours of any slopes of 4% or steeper, general direction of surface drainage, local high or low points or depressions, and any outcrops or other significant geologic features.
- Zoning, including requirements for setbacks and open space. Location-specific restrictions could impact the selection of BMPs
- Soil types (including hydrologic soil groups) and depth to groundwater, which may determine whether infiltration is a feasible option for managing site runoff. A preliminary determination of infiltration feasibility may be made using maps in hydrology and flood control design manuals published by the local permitting agency. Also, site-specific information (e.g. from boring logs or geotechnical studies) may be required by the permitting agency, depending on the site location and characteristics.
- Existing site drainage. For undeveloped sites, determine drainage patterns by inspecting the site and examining topographic maps and survey data. For previously developed sites, locate site drainage and connections to the municipal storm drain system from a site inspection, municipal storm drain maps, and/or the approved plans for the existing development (typically on file with the local municipality).
- Existing vegetative cover and impervious areas, if any.
- Existing trees and arborists reports, if any.

2.1.3 Identify Opportunities and Constraints

Using the site features information gathered above, identify the principal opportunities and constraints for stormwater quality management on the site.

Opportunities might include existing natural areas, low (depressed) areas, oddly configured or otherwise un-developable parcels, easements, and open space (which potentially can double as locations for stormwater quality controls with the permitting agency's approval). Also look at elevation differences on the site which might provide hydraulic head (difference in water surface elevation between inflow and outflow) for structural treatment control measures.

Constraints might include impermeable soils, high groundwater, contaminated soils or groundwater, steep slopes, geotechnical instability, high intensity land use, expected heavy pedestrian or vehicular traffic, safety concerns, or compatibility with surrounding land uses. Also there might be competing environmental concerns on the project site.

2.1.4 Preserve Valuable Site Features

Consider these techniques to preserve natural and environmentally-sensitive features on your site:

- Define the construction limits and boundaries for protected areas, identifying areas that are most suitable for development and areas that should be left undisturbed.
- Cluster the disturbance, including staging and stockpile areas, to reduce disturbance and conserve natural areas.
- Preserve natural vegetation. Vegetation is an integral part of the natural hydrologic cycle. Vegetation intercepts rainfall, and plant roots take up water that soaks into the ground. Also, roots and decaying organic matter such as leaf litter protect the soil structure and soil permeability, and therefore help preserve the pollutant-removal processes that occur in soil. When designing a site, retain as much natural vegetation as possible.
- Consider preserving trees (consider the number, quality and health and location of existing trees), even if the local jurisdiction would allow their removal, for all the reasons given above.
- Set back the construction from rivers, streams, gulches, wetlands, riparian habitats, and shorelines when practicable, or consider context sensitive solutions when designing permanent and temporary structures in these locations (See Figure 10 versus 11). Check with regulatory agencies for additional permitting requirements when designing in these environments.
- Designate and protect natural buffers for waterways and natural areas. If disturbing buffer areas during construction is unavoidable, make revegetation plans to replant them with plants and trees adapted and suited to the site conditions, preferably low-maintenance plants that are suited to the riparian zone. Such plants have a better chance of survival and adaptation to the site over time without an over reliance on water and fertilizers/pesticides.
- Understand the regulatory status of the receiving water to which the site drains. Depending on the nature of the receiving water, certain BMPs may be promoted, restricted or prohibited, or special design or sizing criteria may apply.
    - Determine if the watershed has characteristics that may require special design considerations or constrain the BMP selection.
    - Determine if the watershed and receiving water characteristics require special design considerations that affect the BMP selection. The BMP design is influenced by the type and condition of the receiving waters downstream. Higher pollutant removal may be needed to protect the downstream resources, leading to a shorter BMP selection list.

2.1.5 Lay Out the Site with Topography and Soils in Mind

To minimize stormwater-related impacts, consider applying the following design principles to the site layout:

- Choose a design that replicates the site's natural drainage patterns as much as possible.
- Where possible, conform the site layout to natural landforms.
- Identify topographic lows that might be suitable for locating stormwater quality treatment features.
- Concentrate construction on portions of the site with less permeable soils, and preserve areas that will actively promote infiltration.
- When possible, avoid disturbing steep slopes and erodible soils.
- When possible, avoid excessive grading and disturbance of vegetation and soils.
- When possible, avoid the use of closed conduit systems.
- When possible, avoid compacting soils in open and/ or landscape areas.
- Include grading notes addressing temporary drainage and phasing for disturbed soil areas.

2.1.6 Put Landscaping to Work

Stormwater quality features can often be integrated into landscape areas such as the site perimeter, ditches, medians, and roadside areas. For example, instead leveling waste material, consider creating depressed areas (i.e. bioretention, biofiltration, bioswales) to accept and filter water before sending it off the site. Using landscape areas for stormwater quality features may require some changes in the conventional approach to landscape designs, and may result in larger/wider disturbance areas.

2.1.7 Stop Pollution at Its Source

Rather than managing stormwater runoff only at the final point of discharge from a site, look for opportunities to manage pollution where it is first generated. Source control measures keep pollutants from entering stormwater to begin with, whereas treatment control measures remove pollutants from stormwater runoff.

Evaluate the site to look for opportunities to prevent pollution sources on the land from becoming mobilized by runoff. Construction sites can be one of the largest sources of nonpoint source pollution, especially sediment, during the period of time when the soil is exposed and susceptible to erosion. Control of these sites during this exposure is essential to proper stormwater management. During this step assess whether any Better Site Design (BSD), Low Impact Development (LID) or temporary sediment control techniques can be applied at the site to prevent erosion and minimize site disturbance during construction.

Many sources of information on the control of construction site runoff are available and are incorporated by reference to this guide. Only general descriptions of the temporary sediment control practices will be given in the Manual because the details associated with these practices are available in many other publications.

- Vegetated buffers
- Access/egress and drainage protection
- Runoff control (sediment control basins)
- Perimeter controls (access and egress, inlet protection)
- Soil and Slope stabilization
- Exposed soil covers and reinforcement
- Inspection and maintenance

Keeping the project site clean of debris, proper storage and application of chemicals, exposure of unprotected soil and adequate air quality regulation are all pollution control elements that should be exercised before the BMP selection process even begins. Specific recommended practices include things such as:

- Good Housekeeping (or other suitable term) including landscaping, street sweeping, pavement maintenance, catch basin maintenance and litter control
- Chemical controls including fertilizer/pesticide management and spill prevention
- Streambank stabilization

2.1.8 Reduce Runoff Close to Its Source

Another way to stop pollution at its source is to reduce runoff wherever possible through the incorporation Low Impact Development (LID) also known as Better Site Design (BSD) or Sustainable Development measures. Reducing site runoff will also reduce the volume and duration of flows to local creeks, thus reducing the potential for downstream erosion and habitat impairment. LID measures can reduce project costs for projects that typically require runoff treatment because this can reduce the need for stormwater quality treatment.

The main ways to reduce runoff are to promote infiltration, minimize impervious surfaces, disconnect impervious surfaces (disconnecting impervious surfaces means to intercept the runoff by draining the roof or pavement to a pervious area and not directly to the storm drain system), and promote planting of trees and shrubs to intercept and slow the runoff.

2.1.9 Promote Infiltration Where Feasible

On undeveloped, undisturbed land, rain slowly percolates into the soil and impurities are filtered out and transformed through natural biological processes. When designing a site, look for ways to promote infiltration by disconnection of impervious surfaces and allowing soil to filter and naturally transform impurities. For example, consider dispersing runoff over a landscaped area rather than concentrating in a ditch. Of course, infiltration is not appropriate where it may pose a threat to groundwater quality or cause other problems such as destabilizing a site.

As part of an amended soil layer, proper mulch can also have a measurable benefit in promoting infiltration by supporting a healthy soil, trapping moisture, and slowing the runoff.

Consider infiltration stormwater quality treatment control measures for your site where feasible including such devices as: the infiltration basin and infiltration trench.

2.1.10 MINIMIZE IMPERVIOUS SURFACES

During design, try to limit overall coverage of pavement. This can be accomplished—where consistent with project purpose and need—by designing narrower streets and sidewalks, smaller parking lots (fewer/smaller stalls where possible, and more efficient lanes), indoor or underground parking, and incorporating porous pavement into the design. Examine site layout and circulation patterns and identify areas where landscaping, porous pavement, or stormwater measures can be substituted for pavement.

2.1.11 WHERE FEASIBLE, AVOID DRAINING IMPERVIOUS AREAS DIRECTLY TO A STORM DRAIN

When the built and landscaped areas are defined on your project plans, look for opportunities to minimize impervious areas that are directly connected to the storm drain system. Several options that can be considered for this, include:

- Direct runoff from impervious areas to adjacent pervious areas or depressed landscaped areas.
- Select porous pavements and surface treatments. Inventory paved areas on the preliminary site plan and identify locations where permeable pavements, such as crushed aggregate, turf block, or unit pavers can be substituted for conventional concrete or asphalt paving. Typically, these materials work best in low-traffic parking areas, rather than high-traffic areas such as drive aisles.

2.1.12 TREAT RUNOFF

Treating runoff is required for projects above certain size thresholds (which vary with respect to project category). As previously noted, providing LID measures can reduce or possibly even eliminate the required treatment.

Treatment is accomplished by either detaining runoff long enough for pollutants to settle out or by filtering runoff through sand, soil, or an engineered soil matrix. Typically, the limiting design factors will be available space, available hydraulic head, and soil permeability. In some cases, a small adjustment of elevations within the design can make a particular treatment option feasible and cost effective.

When developing a drainage and treatment strategy, also consider whether to route most or all drainage through a single detention and treatment control measure or to disperse smaller control measures throughout the site. Directing runoff to a single treatment area may be simpler and easier to design, but designs that integrate smaller techniques such as swales, small landscaped areas, and planter boxes throughout the site are typically more cost-effective, less maintenance intensive, and more attractive. The various treatment control measures that may be acceptable for use are:

Bioretention

- Rain gardens
- Depressed parking lot islands

- Road medians
- Tree pits/stormwater planters

Filtration

- Media filters (surface, underground, perimeter) described by media and function
- Surface flow (vegetative) filters (grass channels dry or wet swales, filter strips)
- Combination media/vegetative filters

Infiltration

- Trenches
- Basins
- Dry wells
- Underground Systems

Stormwater Ponds (design based upon components needed to fulfill the desired function)

- Components include pre-treatment, various storage volumes (detention needed), and biologic character.
- Functions include water quality (including thermal impact) and flow control (rate and volume), which determine whether they are wet/dry or some combination

Constructed Wetlands (selection criteria similar to ponds)

- Components include pre-treatment (see also next section), various storage volumes (detention needed), biologic character
- Functions include primarily water quality and flow control, but could also include ecological factors

2.1.13 Hydromodification Management

Urbanization, vegetation removal, agricultural practices will often cause an increase in peak flow as well as runoff duration. Hydromodification Management addresses changes to runoff characteristics from urbanization and other sources that would otherwise result in the artificially altered rate of erosion or sedimentation within downstream natural channels. Hydromodification control measures should be provided (as required) to mitigate this effect. These measures function through attenuation, infiltration, and dispersion of runoff.

2.2 Construction Sites and Potential Pollutants

Stormwater runoff contains numerous natural constituents. However, activities such as construction, if not adequately managed, can increase these constituent concentrations to levels that may impact water quality. Pollutants associated with stormwater may include sediment, nutrients, pesticides, metals, pathogens, litter, petroleum products and chemicals.

There are a number of potential storm water pollutants that are common to Transportation construction sites. The soil-disturbing nature of construction activities and the use of a wide range of construction materials and equipment are the sources of contaminants with the potential to pollute storm water discharges.

Common construction activities that increase the potential for polluting storm water with sediment include:

- Clearing and grubbing operations
- Demolition of existing structures
- Grading operations
- Soil importing and stockpiling operations
- Clear water diversions and Isolation Technique BMPs (Refer to Chapter 5)
- Landscaping operations
- Excavation operations
- Concrete placement and finishing operations

Common construction materials with the potential to contribute pollutants, other than sediment, to storm water include the following:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphalt concrete and Portland cement concrete materials and wastes
- Joint seal materials, form oil, and concrete curing compounds
- Paints, solvents, and thinners
- Wood products
- Metals and plated products
- Fertilizers, herbicides, and pesticides

Construction-related waste must also be managed to prevent its introduction into storm water. Typical waste on construction sites includes:

- Used vehicle fluids and batteries
- Wastewater from vehicle cleaning operations
- Green waste from vegetation removal
- Non-storm water from dewatering operations
- Trash from materials packaging, employee lunch/meal breaks, etc.
- Contaminated soils
- Slurries from sawing and grinding operations

- Wastewater/waste from concrete washout operations
- Hazardous materials waste
- Sanitary waste
- Partially empty buckets and drums improperly sealed

Erosion and sedimentation during construction are perhaps the most visible water quality impacts due to construction activities. Other less visible impacts are associated with offsite discharge of pollutants such as metals, nutrients, soil additives, pesticides, construction chemicals, and other construction waste. After the construction project is complete, the changes to the landscape due to the project may alter the existing runoff regime or introduce new sources of pollutants that continue to impact water quality into the future. The magnitude of stormwater impacts depends on construction activities, climatic conditions, and site conditions. Development of a comprehensive SWPPP requires a basic understanding of the impacts, pollutant sources and other contributing factors, as well as suitable BMPs which can eliminate or reduce these impacts. A brief summary of common stormwater pollutants associated with transportation facilities and their impact on water quality are described below.

2.3 Potential Pollutants

2.3.1 Total Suspended Solids (TSS) AKA Sediment and Soil

Sediment or TSS is considered a pollutant when it significantly exceeds natural concentrations and can have a detrimental effect on the beneficial uses designated for the receiving water. Possible sources of TSS include natural erosion, runoff from construction sites, and other operations where the surface of the ground is disturbed. In addition, increased runoff from new impervious surfaces can accelerate the process of channel erosion, which in turn can increase TSS in runoff.

Sediment from soil erosion is made up of soil particles and gravel washed into rivers, lakes, streams and marine environments. It is the major pollutant in surface waters. Excessive sediment in waterbodies impairs aquatic ecosystems, reduces public water storage and increases drinking water treatment costs. These sediment particles are also a vehicle to transport other pollutants including nutrients, metals, petroleum products and bacteria to surface waters.

Runoff from construction sites is the major source of sediment in urban areas under development. Another major source of sediment is off-site streambank and streambed erosion. Though part of natural processes as described in the last section, this erosion can be by product caused from higher peak runoff flow rates and volumes in modified landscapes.

2.3.2 Nutrients

Excessive inputs of nutrients such as phosphorus and nitrogen to receiving waters can overstimulate the growth of aquatic plants to the detriment of other aquatic life and to some beneficial uses of the receiving water. Nutrients generally have more adverse effects in water bodies with slow flushing rates, such as slow moving streams and lakes. Also, nutrients attached to TSS in storm water runoff can cause problems where they settle out downstream.

Sources of phosphorus that may be present in highway runoff include tree leaves, surfactants and emulsifiers, and natural sources such as the mineralized organic matter in soils. Phosphorus may be present in storm water discharges as dissolved or particulate orthophosphate, polyphosphate, or organic phosphorous.

Potential sources of nitrogen in highway runoff include atmospheric fallout, nitrite discharges from automobile exhausts, fertilizer runoff, and natural sources such as mineralized soil organic matter. Nitrogen may be present in storm water discharges as nitrate, nitrite, ammonia/ammonium, or organic nitrogen.

Phosphorus and nitrogen are the primary forms of nutrients that can cause water pollution. Lawn fertilizers used to establish and maintain vegetation can be significant sources of phosphorus. Nitrogen comes from fertilizer, too, but is also found in animal wastes, grass clippings and effluent from leaking septic systems.

Phosphorus and nitrogen are sources of food for the algae and bacteria that live in lakes, streams, rivers and marine environments. Waters polluted with these nutrients develop large numbers of algae and bacteria that can deplete available oxygen, causing fish and other beneficial organisms to die (Hypoxic and Anoxic conditions).

Nutrient pollution can be prevented by composting grass clippings and animal wastes, and repairing leaking septic systems. Nutrient pollution from construction sites can be minimized by applying fertilizer at the rate recommended by a soil test, or conserving topsoil to reduce or eliminate the need for fertilizer soil amendments.

2.3.3 Pesticides

A pesticide is a chemical agent designed to control pest organisms. The most common forms of pesticides are organic chemicals designed to target insects (insecticides) or vascular plants (herbicides). Pesticides have been repeatedly detected in surface waters and precipitation in the United States. Water is one of the primary media in which pesticides are transported from targeted applications to other parts of the environment. As the use of pesticides has increased, concerns about the potential adverse effects of pesticides on the environment and human health have also increased.

2.3.4 Metals (Particulate and Dissolved)

Metals in storm water runoff may be in a dissolved phase or a particulate form attached to TSS. Some Treatment BMPs are effective for removing specific particulate metals, but not for removing dissolved metals. If there are special requirements to remove dissolved metals (e.g., to address a TMDL or other site-specific requirement), then the designer should contact the DOH-CWB to identify the appropriate BMP requirements. Metals in the particulate phase may be removed through sedimentation or biofiltration.

Possible sources of metals in highway runoff include the combustion products from fossil fuels, the wearing of brake pads, and the corrosion of metals, paints and solder. Metals can also reach receiving waters through the natural weathering of rock and soil erosion.

2.3.5 Pathogens

Pathogenic microorganisms including viruses, bacteria, protozoa, roundworms, tapeworms, and flatworms (aka flukes) are of concern in storm water runoff. The direct measurement of specific pathogens in water is extremely difficult. For that reason, the coliform group of organisms is commonly used as an indicator of the potential presence of pathogens of fecal origin.

Sources of total and fecal coliforms in storm water runoff are ubiquitous (e.g., soil particles, droppings of wild and domestic animals, etc.). Human sources could include illicit sewer connections and seepage from septic tanks.

2.3.6 Trash

Trash in storm water is defined as manufactured objects made from paper, plastic, cardboard, glass, metal, etc. This definition does not include materials of natural origin such as gravel or vegetation. Trash in surface waters can inhibit the growth of aquatic vegetation, harm aquatic organisms by ingestion or entanglement, convey other pollutants, such as toxic substances, and cause aesthetic problems on shorelines.

2.3.7 Petroleum Products

Petroleum products float on water and are visible. The hydrocarbons in petroleum have a strong characteristic for attaching to sediment particles. Hydrocarbons are known to be toxic to aquatic organisms. Common sources of petroleum products at the construction site are oil storage, fuel facilities, leaks from crankcases and improper disposal of drain oil.

2.3.8 Chemicals

Paints, solvents, sealants, cleaning agents and caulks may be found on construction sites. These chemicals along with chemically composed or treated construction materials may enter the runoff water. Water quality is easily degraded by these chemicals and removal during water treatment processes may be feasibly, fiscally, and logistical difficult.

2.4 Water Chemistry

Pollutants in stormwater can be affected by multiple chemical factors including pH, hardness, salinity, and temperature.

2.4.1 pH

pH is a measure of hydrogen ion concentration, with low pH (pH<7) being acidic, pH = 7 being neutral, and high pH (7<pH<14) being basic or alkaline. In addition to direct impact on fish and other wildlife, pH also significantly affects other chemical characteristics of stormwater. Lowering pH increases the solubility of metals, resulting in a higher fraction of metals present in the dissolved state. Raising pH increases the levels of the more toxic form of ammonia.

2.4.2 Hardness

Water hardness measures the presence of multivalent cations (positively charged ions) dissolved in water, particularly calcium and magnesium divalent cations (ions with a charge of +2). Increased water hardness typically decreases the toxicity of metals for fish. Hardness does not have a substantial effect on the toxicity of metals for fish in marine waters.

2.4.3 Salinity and Temperature

Salinity is the dissolved salts content of a body of water. Increases in salinity of surface waters can reduce the amount of oxygen that can be dissolved in the water. Increased temperature has a similar effect on dissolved oxygen. Salinity also affects metal toxicity, frequently increasing it.

2.5 Transport of Stormwater Pollutants

Stormwater pollutants enter receiving waters through many routes. The following sections describe what happens to stormwater pollutants when these substances come into contact with stormwater.

2.5.1 Initial Transport

Pollutants are deposited on road surface as particulates (e.g., brake pad dust, dirt, and salt) and liquids (e.g., oil, antifreeze, gasoline), then washed off the undercarriage of vehicles during storm events (e.g., rusted metal, hydrocarbons), or washed onto roads from adjacent exposed soils or landscaping. Pollutants on the roadway surface may coat or bind to soil particles, or may remain unbound on the road surface.

When precipitation hits impervious surfaces such as roadways, roofs, and sidewalks, contaminants may be picked up and transported in stormwater runoff, whether bound to particulate matter, dissolved in solution, or in suspension. Particulate material may be transported as suspended load or as bed load (bumping along the bottom or "bed" of the channel).

2.5.2 During "First Flush"

First flush describes the elevated pollutant concentrations that are often experienced during the initial part of a storm. Pollutant concentrations may peak during the "first flush" of a storm, but concentration peaks may or may not coincide with the load peaks since that is a factor of both concentration and volume of runoff. Different pollutants may also have peaks at different times during a storm, depending on how easily they are entrained. The prominence of the first flush varies considerably between storms and between locations. Factors influencing the magnitude of the first flush include the availability of pollutants on the road surface, and the form of the drainage area. The simpler and shorter a drainage area is, the more likely it is that the first flush will be clearly expressed.

Along with the storm event first flush, there may be a seasonal first flush when pollutants that have accumulated during an extended dry period are collected during the first storms of the season. Larger pollutant loads and higher median concentrations are often observed during the first storms of the season than storms later in the wet season or those closely following a series of storms. A seasonal first flush is not always present.

2.5.3 After Entry into a Water Body

Once stormwater carrying pollutants enters a receiving water body, several things can happen to the pollutant load. Compounds bound to soil and other solids may settle out of the water column or be filtered out by vegetation. Chemicals can be removed from the water column by biological uptake (i.e., plants and aquatic animals), or become attached to sediment and organic matter. Pollutants also may be degraded biologically (e.g., by microbes), chemically, or with sunlight (photodegradation). Compounds that are not removed from the water column may be transported to other water bodies. Pollutants that are deposited and removed from the water column may be re-entrained later, either by erosion, or by reentering a dissolved state if the chemical environment changes.

2.5.4 During Downstream Transport

During transport downstream, the concentration of pollutants from a discharge of highway runoff will decrease through three mechanisms. The first is dilution by increased flow in the stream from tributaries and additional base flow. Second is pollutant removal as described above. Finally, dispersion as the plume of stormwater becomes elongated due to mixing and irregular flow within the stream. This last effect means that the peak concentration in the plume will decrease, while the extent of the plume will increase.

2.6 Impacts of Water Quality Pollution on Aquatic Organisms

Fisheries are an important resource in Hawaii. However, despite the abundance of fresh water and hundreds of streams, the only freshwater fishes native to Hawaiʻi are four gobies and an eleotrid, collectively known as oʻopu. Two marine fishes, aholehole and mullet, are transient inhabitants of lower stream reaches. While these species have differing habitat requirements and tolerances, all are vulnerable to increased pollutant loads and concentrations.

Anthropogenic (human-caused) pollution via stormwater can harm fish by reaching lethal levels of toxicity, by affecting the health and viability of fish populations, by damaging or changing food sources (such as macorinvertebrates), and by physical changes to the aquatic habitat. To protect this dwindling resource, stormwater must be treated based on both pollutants generated and vulnerability of species in receiving waters.

The toxicity to fish of a given chemical is often not directly related to chemical concentration. Instead, toxicity to fish is affected by the bioavailability of the compound. Bioavailability of a compound to fish can be affected by water temperature, pH, dissolved organic carbon, suspended sediment, and hardness (pH and hardness are discussed in water chemistry section of this chapter); other water quality parameters are discussed below.

2.6.1 Water Temperature

Elevated temperatures can have lethal or non-lethal effects to aquatic organisms, depending on the temperature and duration of exposure. Acute non-lethal effects of temperature include behavior adjustments such as reduced feeding and relocation to cooler waters. Chronic non-lethal effects of elevated temperatures include reduced growth and development, both of which can affect survival and reproduction of aquatic species.

2.6.2 Sediment

Sediment can affect fish both directly (when suspended) and indirectly (when settled and accumulating). In suspended form, sediment may damage gill tissue, particularly if the sediment particles are angular. Several fish species are sight feeders, and murky waters can decrease their ability to find food. Suspended solids also can increase the stress response in fish, which in time can disrupt the proper functioning of other systems and alter fish behavior. Suspended solids may have a substantial effect on the bioavailability of other pollutants. Contaminants can absorb or bond to the surface of the particles, preventing them from being absorbed by fish and becoming toxic.

When sediments settle and accumulate they can degrade fish habitat, including sensitive spawning habitat which may requires clean gravel. Changes in a water body's substrate due to excessive sedimentation can also lead to a change in the benthic macroinvertebrate community, and thus food sources for fish. Impairment of habitat can have long-term or delayed adverse effects on fish populations.

2.6.3 Metals

Stormwater from roadways contains metals in concentrations that may be toxic to fish, particularly copper, zinc, lead, and cadmium. The three known physiological pathways of metal exposure and uptake in fish species are gill surfaces, olfactory receptor neurons, and the digestive system. Dissolved metals are the most bioavailable form, and can be taken up by the fish directly through the gills.

Toxicity is affected by water's pH, hardness and salinity, and by other chemicals in the water.

2.6.4 Nutrients

Nutrients consist of chemicals that stimulate growth, particularly nitrogen and phosphorus. The largest concern about nutrients is their overstimulation of algal growth in receiving waters, particularly stagnant waters such as ponds, lakes or sloughs. Algae may affect the food chain by competing for surfaces with organisms that fish use as a food source, or in more extreme cases, cause eutrophication. Eutrophic waters experience explosive growth in algae populations, followed by a crash as nutrients are depleted. The algal die-off and decomposition uses up the dissolved oxygen in the water, causing fish and other aquatic life to suffocate.

Different forms of nitrogen and phosphorous exhibit different degrees of algal growth, with orthophosphates typically having the highest potential to cause eutrophication, usually because phosphorus is the nutrient limiting plant growth—many algae can fix their own nitrogen from the atmosphere. Stagnant waters and slow moving streams are particularly vulnerable to these hazards.

2.6.5 Organic Pollutants

Many different organic pollutants are toxic to salmonids, including pesticides, herbicides, pthalates, phenols, and poly aromatic hydrocarbons (PAHs). Typical levels of these pollutants in roadway runoff are not clearly defined, and in many cases may be below toxic concentrations.

2.6.6 Acute and Chronic Effects

Acute (limited duration) and chronic (longer duration) exposure of fish to contaminants can result in various non-lethal effects. Physiological effects include altered respiration rate, blood chemistry (glucose levels, cortisol levels, etc.), swimming speed, breathing rate, and oxygen consumption. Numerous chemicals act as endocrine-disrupting compounds (EDCs), including estrogenic compounds, PAHs, flame retardants, and metal compounds. Chronic exposure to these compounds can affect fish behaviorally, resulting in altered hormone-dependent behaviors (e.g., spawning, migration), and physiologically, resulting in physical changes (e.g., intersex, the presence of both male and female reproductive organs in an individual).

2.6.7 Indirect Impacts to Water Quality

The placement and design of highway facilities can modify elements of the landscape that have beneficial hydrologic and water quality functions. Those modifications can affect the hydrology and water quality of receiving waters, even if no highway runoff reaches them. The most important of these landscape elements are riparian zones and wetlands.

2.6.7.1 Riparian Zones

Riparian zones can, when in good condition, provide several water quality benefits. Trees and shrubs produce shading, which is important for regulating temperature in smaller streams. They also act as sources of food and nutrients for the biotic community of the stream, including macroinvertebrates, fish, and amphibians. During high flow events, the same trees and shrubs slow down overbank floodwaters and provide refugia for fish. Vegetation on the stream bank is important for controlling lateral erosion. Riparian zones can also be effective at removing nutrients, sediment and other pollutants carried by runoff from adjacent developed or agricultural lands.

Destruction of riparian vegetation can therefore lead to the following adverse impacts:

- Increased stream temperature
- Increased pollutant loads derived from adjacent land use
- Reduced food supply for aquatic animals
- Increased bank erosion, which in turn leads to increased turbidity, and potentially sediment deposits on spawning gravels and modified stream geometry
- Loss of high flow refugia for fish.

2.6.7.2 Wetlands

Wetlands provide both water quality and hydrologic benefits. Even degraded wetlands can effectively provide those functions. The wetlands usually perform these functions for the drainage area as a whole, not just for highway runoff. Impacts to wetland can reduce the capability and the capacity of the wetland to perform certain water resources functions. Loss of capability could result from changes in vegetation composition, structure or density, or from altered hydrology. Loss of capacity would result from a reduction of size, diversion of water away from the wetland, or other modification of the hydrology.

Loss of wetlands can lead to the following adverse impacts:

- Increased pollutant loads discharged to streams and lakes
- Higher flood peaks downstream of the wetland
- Reduced low flow discharges downstream of the wetland
- Loss of aquatic habitat.

2.6.7.3 Development

Induced or facilitated development may also be considered a secondary or indirect impact of a project on water resources. In Hawaii, highway projects support the designated land uses, so it is rare that a highway project can be said to cause development, but they do support planned and approved development. The result of development is that expected from the addition of impervious area with new roads, buildings and landscape modifications. It is not the responsibility of the PDT to analyze the impacts from associated development in any depth, but they should be addressed in NEPA analysis if reasonably foreseeable.

2.7 Step by Step Process for SWPPP/IWPPP Development and Implementation.

2.7.1 Internal Roles and Responsibilities

NPDES compliance clearly requires an interdisciplinary approach. However, roles and responsibilities for the various NPDES requirements need to be defined and responsibility/accountability for the overall program needs to be assigned. The following recommendations are made to promote consistency within FLH and thereby facilitate development and maintenance of an FLH NPDES Program. In general:

- Environmental staff should be responsible and accountable for defining the NPDES processes required for program compliance, as well as monitoring and refining those processes for adequacy and continuous improvement.
- Project Management staff should be responsible and accountable for ensuring that all program level processes are addressed and executed to the appropriate degree on the project development and delivery level.
- Environmental staff should be responsible for compiling the stand-alone SWPPP/IWPPP, as well as preparing and submitting the NOI and NOT.
- Design staff should be responsible for development of the Erosion and Sediment Control (ESC) plans and specifications included in the PS&E package.
- Construction staff should be responsible for implementing and maintaining the SWPPP/IWPPP during the life of the construction project.
- Technical Services staff should act as a program and/or project resource to provide necessary support information, such as custom analysis, design, or evaluation of standard drawings, SCRs, and new products.

2.7.2 External Roles and Responsibilities

It is recommended that FHWA and HDOT use program agreements to define general agency roles and responsibilities associated with the NPDES Program. Project Agreements should be used to clearly define project-specific partner roles and responsibilities early in the project development process. Partner agencies should be considered for one or more of the following roles and responsibilities:

- Providing re-vegetation design and specifications

- Removing temporary erosion and sediment control devices that need to be left in place until final stabilization is achieved
- Submitting an NOI and assuming the NPDES responsibilities when construction work is complete but final stabilization has not yet been achieved.

Assigning these roles and responsibilities to the local FHWA or HDOT partner agencies is considered appropriate for three primary reasons:

- The owning agency or the land management agency has intimate local knowledge of the climatic, soil conditions and ground cover type and density that can be supported. This knowledge allows them to identify and develop the most appropriate final stabilization strategy and design.
- The owning agency has responsibility for maintenance of the roadside and thereby, a vested interest in ensuring that final stabilization can be achieved and maintained.
- The brief, contractual nature of the FHWA or HDOT presence makes it very difficult to address NPDES requirements between the end of the construction contract and final stabilization. This is especially true in arid to semi-arid regions of the country where final stabilization may take time to achieve.

2.7.3 Step By Step Process Description and Recommendations

The 2007 EPA Guide included in Appendix C is a reference that can be used by the PDT as basic guidance for project-level compliance. Additional State and local requirements apply for compliance in Hawaii and these have been included in the IWPPP sample found in Appendix G.

The EPA guidance describes seven steps for developing and implementing project-specific SWPPPs. Recommendations for improving the SWPPP development and implementation practices within FLH are listed below in the context of EPA's 7-step process.

2.7.3.1 Step 1: Site Assessment and Planning (Chapter 3 in 2007 EPA Guide (Appendix C)

- **Environment** staff should be responsible for identifying, documenting, and communicating the applicable NPDES requirements and other related environmental issues. This includes identifying the governing construction general permit (CGP), applicable state and local ordinances, and sensitive resources such as impaired waters, presence of aquatic ESA species or critical habitat.
- **Environment** staff should conduct a site assessment jointly with Design, whenever appropriate, to evaluate and document site conditions, risks, and opportunities associated with erosion and sediment control. The EPA SWPPP Template should be used as a checklist when conducting this review. This review should be conducted early in the project development process as part of the early coordination field review or other planned review.

2.7.3.2 Step 2: SWPPP Development - Selecting Erosion and Sediment Control BMPs (Chapter 4 in 2007 EPA Guide.)

- **Design** staff should develop an erosion and sediment control plan as part of the contract package. The plan should include standard drawings, details, quantities, and specifications for all structural BMPs. BMPs should be selected from the approved BMPs listed within this manual. Wherever possible, rely on erosion controls to keep sediment in place. Back up those erosion controls with sediment controls to ensure that sediment doesn't leave the site.
- **Design** staff should include contract specifications and pay items for non-structural BMPs to address unique site conditions, requirements or risks as needed. Examples include water quality monitoring or an onsite Erosion and Sediment Control Supervisor.
- **Environment** staff should provide progress reviews of the plans and specifications (typically 30, 50, 70, and 95%) to ensure compliance with the NPDES CGP requirements and to facilitate development of the stand-alone SWPPP described in Step 4 and the Notice of Intent (NOI) described in Step 5.

2.7.3.3 Step 3: SWPPP Development – Selecting Good Housekeeping BMPs (Chapter 5 in 2007 EPA Guide)

- **Design** staff should be responsible for selecting good housekeeping BMPs and providing appropriate contract language in the specifications. EPA defines good housekeeping BMPs as those designed to prevent contamination of stormwater from a wide range of materials and wastes at the construction site.

2.7.3.4 Step 4: SWPPP Development - Inspections, Maintenance, and Recordkeeping (Chapter 6 in 2007 EPA Guide.)

- **Design** staff should include contract specifications for inspection, maintenance, and recordkeeping required during construction. Contract specifications should identify the government provided SWPPP as a key project record and require appropriate care and maintenance throughout the life of the construction project including disposition of the SWPPP at the end of construction.

  EPA and many state general permits require that a sign be posted near the main entrance of construction sites. It is common for the permits to require that the sign contain a copy of the NOI, the location of the SWPPP, and a contact person for viewing the SWPPP.
- **Environment** staff should be responsible for compiling a stand-alone SWPPP that will be provided to Construction for directing and documenting the implementation of the SWPPP as described in Step 6. Elements of the stand-alone SWPPP include the CGP, erosion and sediment control plan from the contract package, associated narrative, contract specifications, NOI, inspection forms, and any other information required to comply with the CGP.

2.7.3.5 Step 5: Certification and Notification (Chapter 7 in 2007EPA Guide)

- **Environment** staff should be responsible for preparing the NOI, obtaining an authorized signature on the certification, and submitting the NOI in accordance with the CGP.

2.7.3.6 Step 6: SWPPP Implementation (Chapter 8 in 2007 EPA Guide.)

- **Construction** staff is responsible for ensuring inspections, maintenance, and recordkeeping are performed in accordance with the CGP and the SWPPP.
- **Construction** staff is responsible for reviewing and approving contractor requested modifications to SWPPP.
- **Construction** staff is responsible for directing changes to the SWPPP as needed to ensure compliance with the CGP.
- **Construction** staff is responsible for requesting support from Environment, as needed. As the lead office, Environment should be the single point of contact for managing such requests and enlist the assistance of Design, Tech Services, or others, as needed.
- **Construction Operations Engineer** (COE) or **Project Engineer** (PE) should conduct a Quality Assurance (QA) review of NPDES compliance during every project site visit. The QA review should include inspection of the SWPPP to ensure that it is properly maintained. The QA review should also include an inspection of site conditions to ensure that site conditions match the SWPPP and that erosion and sediment control is effective. The COE's QA reviews should be documented in the SWPPP.
- **Construction** staff should be responsible for submitting the final post-construction SWPPP to Environment when construction work is complete.

2.7.3.7 Step 7: Final Stabilization and Permit Termination (Chapter 9 in EPA guidance.)

- If the owner agency is responsible for final stabilization, Construction should submit the final as-built SWPPP to Environment. Environment should prepare and submit the NOT, and transfer the SWPPP to the owner agency. The owner agency would then be responsible for filing an NOI and assuming all of the NPDES requirements through final stabilization in accordance with the program or project agreement. This is a practice successfully applied in CFL.
- If FLH is responsible for final stabilization, Construction should remain responsible for all NPDES requirements until final stabilization is achieved and the final SWPPP is submitted to Environment. Environment should prepare and submit the NOT and archive all SWPPP related records with the construction records.

2.7.3.8 Task -Specific Recommendations

The following recommendations are provided to assist with the details of completing various tasks associated with SWPPP/IWPPP development and implementation in accordance with the 2007 EPA Guide and state specific requirements.

2.7.3.8.1 Develop Site Plan Design

- Include topographic mapping in SWPPP document to better show drainage patterns and discharge points.
- Show "clearing limits" on Erosion and and Sediment Control plans.
- Determine if a pay item for Erosion Control Supervisor is appropriate,

2.7.3.8.2 Measure Area of Disturbance

- Area of disturbance should be based on clearing limits, not slope stake limits.
- Where no definition is provided by the CGP, consider defining "disturbance" as any erodible surface of 1 acre or more, except travel ways of gravel or better surface type.

2.7.3.8.3 Determine Drainage Area

- Calculate area draining to all non-standard, structural BMP devices. An example is a sediment basin.
- Provide sediment basin(s) when the area of disturbance within a given drainage area is ten acres or more. (EPA sediment basin sizing criteria – lesser of 3600 cu. ft. per acre or volume of Q2 runoff from drainage area.)

2.7.3.8.4 Determine Runoff Coefficient

- Required for sediment basin design in drainage areas of 200 acres or less.

2.7.3.8.5 Construction/Implementation

- Consider paying for maintenance of ESC items with equipment and labor hours, or prorating a lump sum amount over the life of the contract..

CHAPTER 3:

3 STORMWATER TREATMENT PROGRAM - BEST MANAGEMENT PRACTICES AND SELECTION MATRIX

3.1 SUMMARY

The FHWA and HDOT are proposing refinements to the Stormwater Management Program (Program) to streamline the stormwater, 404 and 401 permitting process, while continuing to meet their missions as transportation agencies. Under the Program, the goal is to reduce the amount of runoff generated to the extent practicable before relying on engineered stormwater facilities to meet water quantity and water quality requirements. Through this process, FHWA and HDOT are working internally with management, project delivery and maintenance teams, as well as with representatives from regulatory agencies to define the improvement areas. The key outcomes from the Program include advancement in the following areas:

1. Stormwater treatment guidance: Best Management Practice (BMP) Selection Tool and User's Guide
2. Expedited Clean Water Act Section 404 and 401 permitting for Transportation projects.

This manual focuses on the stormwater treatment guidance component of the Program (item 1 above). The impetus for developing the BMP Selection Tool is to have a transparent and technically based BMP selection process that documents the decisions and streamlines overall stormwater management and permitting with the regulatory agencies. The BMP Selection Tool is one component of an overall "Stormwater Treatment Design Process." The Stormwater Treatment Design Process integrates pollution prevention and minimization techniques, low impact development and other practices to reduce the runoff generated by the project once the project goals and objectives have been defined and site characterization has occurred.

Generally, the BMP Selection Tool uses metrics and ratings for treatment suitability (effectiveness) for pollutants of concern, site suitability and physical constraints, maintenance needs and constraints, and costs to document the decision-making process for selecting among a suite of potential BMPs for a project. However, the BMP Selection Tool prioritizes the use of "preferred" BMPs, which include infiltration-focused technologies and those BMPs that have a soil-amendment feature. Input and review by the regulatory agencies can be minimized and streamlined when the "preferred" BMPs are selected.

Finally, the BMP Selection Tool uses "primary treatment mechanisms" rather than removal efficiency data reported for specific BMPs to determine the treatment suitability for pollutants of concern (POC). Primary treatment mechanism refers to the prevailing unit operations that result in the removal or chemical breakdown of a given compound. If a BMP employs a given treatment mechanism, then by definition the BMP is considered effective at treating the pollutant of concern.

The goal is to promote integrated stormwater design and LID in its project development and design process. Under the Program, consideration is given to these approaches at the project development and definition phase and throughout the preliminary and final design phases. The goal for FHWA and HDOT, which is consistent with the regulatory agencies' position, is to reduce the amount of runoff generated to the extent practicable before relying on engineered stormwater facilities to meet water quantity and water quality requirements. The "traditional" POC for roadway projects (e.g., suspended solids, oil and grease, and particulate metals) are addressed in this process, while extra focus may be given to BMPs that address other POCs of concern to other regulatory agencies.

The project designer usually provides layout sheets showing the suggested locations of structural BMPs. The purpose of these sheets is to show the contractor the designer's anticipated placement of these BMPs covering activities such as contractor staging areas, approximate location of concrete washouts, approximate locations for storage of materials, and preferred locations for vehicle and equipment maintenance. These are not intended to be highly detailed drawings. Typically, these layouts can be drawn on l:200 and l:500 scale drawings. Where multiple stages of construction are anticipated, the designer should show how deployment of the BMPs is expected to change over time. These locations and layouts will be, in most cases, subject to the contractor's phasing of the work and timing of operations. As a result, many of the suggested locations will be modified by the contractor in the SWPPP/IWPPP. If these draft layouts are provided, the layout sheet usually contain a disclaimer stating that the temporary BMP locations are suggested, and that the Contractor is ultimately responsible for developing a SWPPP/IWPPP that complies with the Permit. Refer to Appendix C for the EPA's guide to developing a SWPPP/IWPPP.

This section presents a flexible approach to BMP selection that allows a stormwater manager to select those BMPs most able to address an identified POC. Selecting an inappropriate best management practice (BMP) for a site could lead to adverse resource impacts, friction with regulators if a BMP does not work as anticipated, misperceptions about stormwater control success, and wasted time and money. Careful selection of BMPs will prevent negative impacts from installing the wrong BMP at the wrong location. Regulators can similarly use these matrices to check on the efficiency of proposed BMPs.

3.2 Stormwater Treatment Guidance and BMP Selection Matrix

The "Stormwater Treatment Design Process" is a comprehensive process that starts with problem definition and continues through development of the conceptual design of the selected stormwater treatment system. Under this process, stormwater management begins with simple methods that minimize the amount of runoff that occurs from a site and methods that prevent pollution from accumulating on the land surface and becoming available for wash-off. Even though we know that we will never be able to fully accomplish either of these goals, we can make substantial progress using BSD/LID techniques and the pollution prevention, volume minimization, temporary construction erosion control and structural BMP techniques.

After all of the efforts possible are made to minimize runoff and surface wash-off, we must recognize that some potential for runoff will occur. The next major category of BMPs focuses on the collection and treatment of runoff locally and regionally, either as stand-alone practices or in treatment train combinations. Some of the available BMPs are best used to reduce or manage runoff volume, while others focus on water quality protection. Some planning and construction BMPs are easy to implement, while others involve more extensive engineering and design. Figure 6 illustrates the conceptual stormwater treatment design process, of which the "BMP Selection Tool" is one part. Through the process, the project delivery team integrates pollution prevention and minimization techniques, LID, BSD and other practices to reduce the runoff generated by the project once the project goals and objectives have been defined and site characterization has occurred.

The process includes the development of key decision documents that will be used by HDOT to assist in the permitting process for their projects. One of the key decision documents is the "output" from the BMP Selection Tool. The BMP Selection Tool is used to:

- Evaluate the engineered, post-collection and conveyance facilities used to treat stormwater runoff and protect water quality during construction.
- Document design and BMP decisions made by FHWA and/or HDOT's project development team in a decision support framework.

As Figure 6 illustrates, the BMP Selection Tool is applied after the project objectives and treatment goals have been defined and after the preliminary conceptual site layout and integrated stormwater design considerations have been developed. At this point, the Project Team has considered appropriate LID/BSD options to reduce runoff and the design process is at the point where "end-of-pipe" stormwater treatment options are needed.

The BMP Selection Tool was initially developed by the Oregon Department of Transportation (ODOT) and is based on the information from the key references and literature reviewed by their interagency team. These primary references were also used to develop BMP Summary Reports that include the basis for ratings assigned to the metrics in the BMP Selection Tool. Figure 7 shows the components (or metrics) of the selection process, key "check-in" points within the PDT and the regulatory agencies, and the "streamlining benefits" of the BMP selection process.

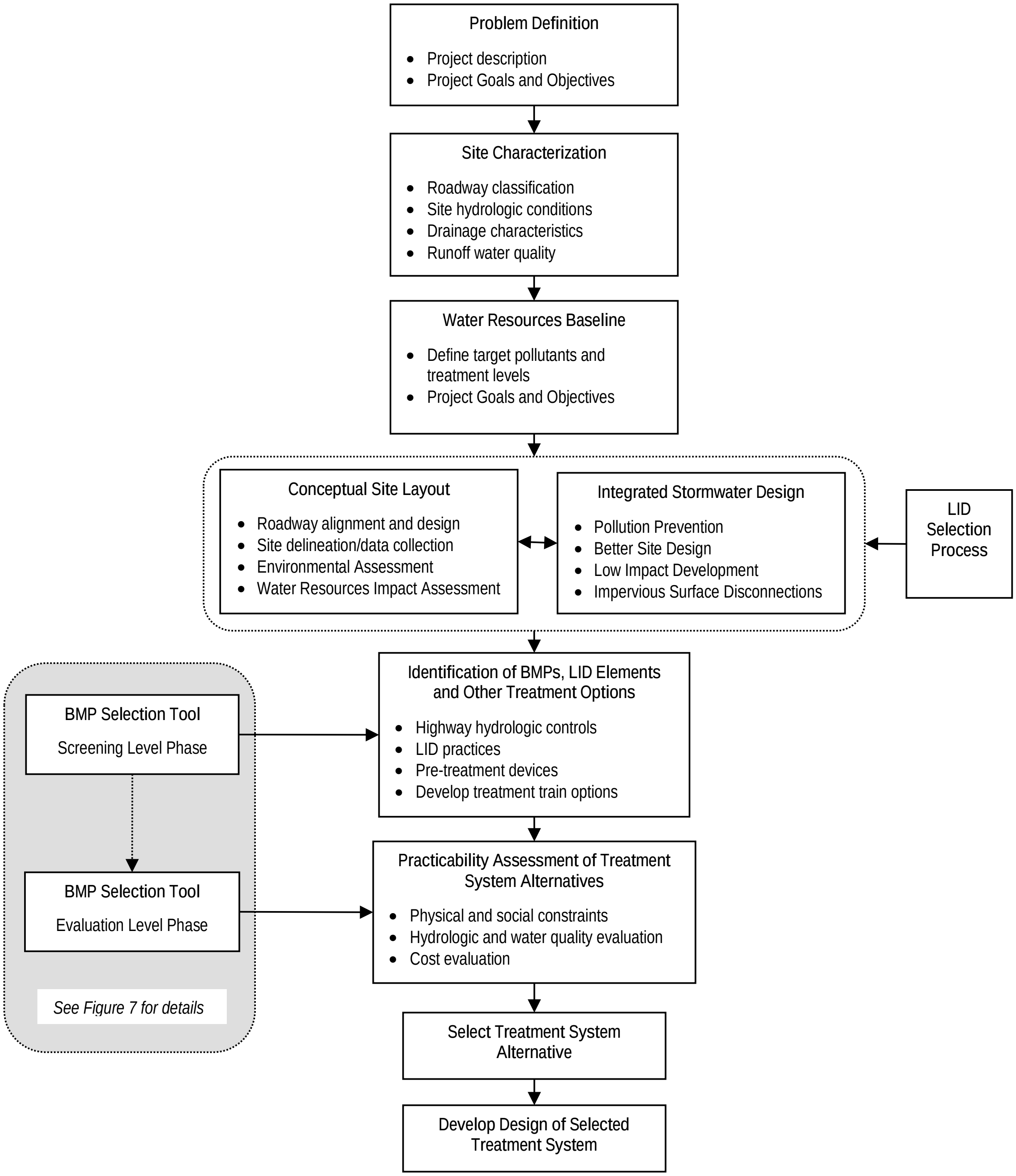


Figure 6. Conceptual Stormwater Treatment Design Process

The BMP Selection Tool includes metrics and ratings for treatment suitability (effectiveness) of pollutants of concern, site suitability and physical constraints, maintenance needs and constraints, and costs. The selection process is generally applied in two steps: (i) BMP screening level; and (ii) treatment train alternatives evaluation. The BMP screening step in the selection process evaluates individual BMPs and is used to identify the most appropriate BMPs for the project. Those BMPs that are screened through are used to develop treatment train alternatives. These alternatives are evaluated further and in more detail with respect to conceptual design layouts for the individual components of the treatment train. The alternatives are evaluated using similar metrics from the screening step. As Figure 7 shows, there are at least two opportunities for the regulatory agencies and the Project Team to discuss documented decisions in the selection process.

"Preferred" Permanent BMPs have been identified as part of the literature review for treatment effectiveness. If "preferred" BMPs for the target pollutants are feasible and appropriate for the project site, streamlining of the BMP selection process is possible and the formal evaluation and scoring process can be by-passed, as illustrated in Figure 7. While the stormwater/hydraulics engineer still needs to design the system and ensure that the BMP is feasible and meets design standards, input and review by the regulatory agencies can minimized and streamlined when the preferred BMPs are selected. Preferred Permanent BMPs fall into the following categories:

- Pretreatment
- Infiltration
- Filtration
- Pool and Ponds
- Soil Amendment Features

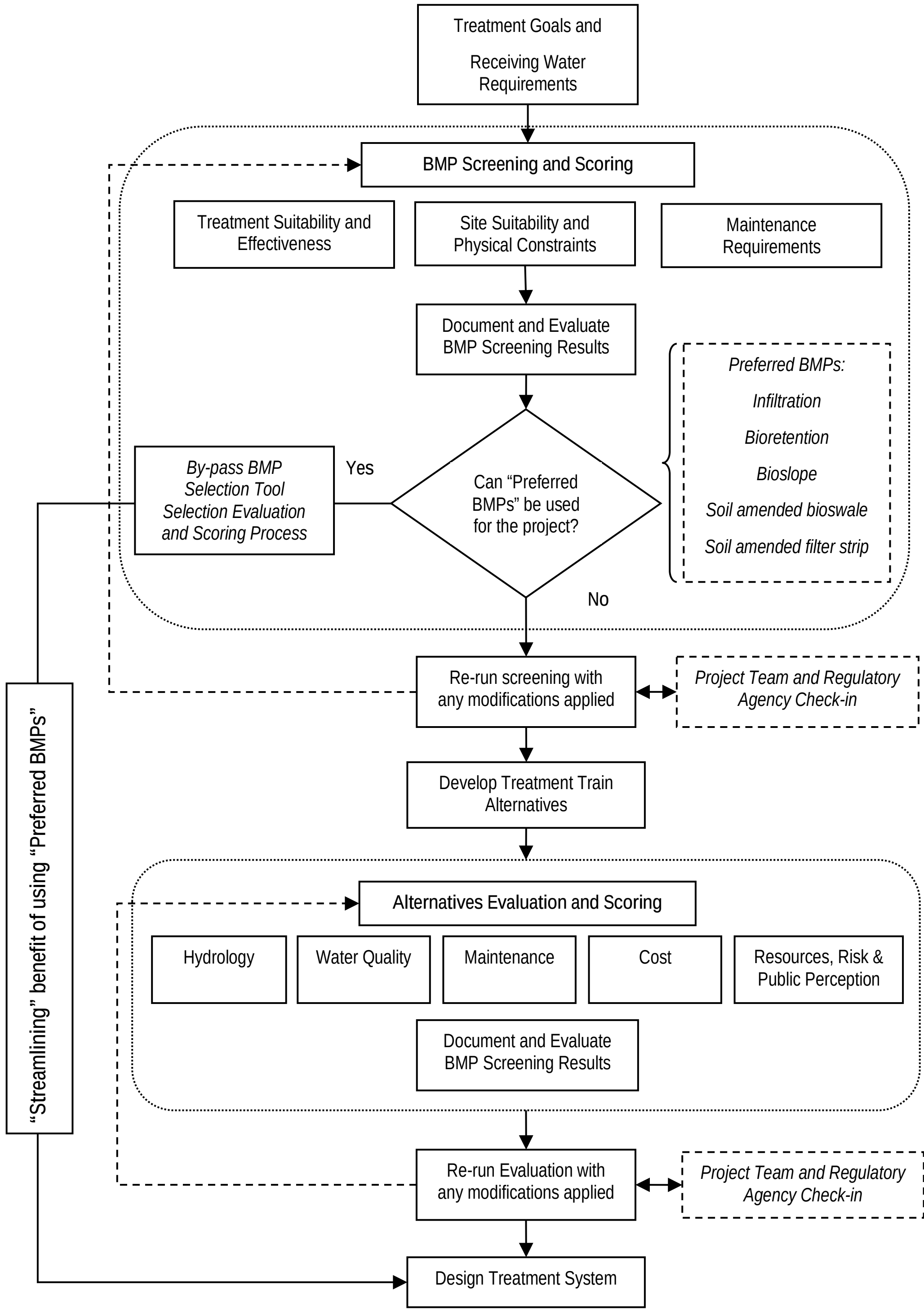


Figure 7. Schematic of BMP Selection Tool

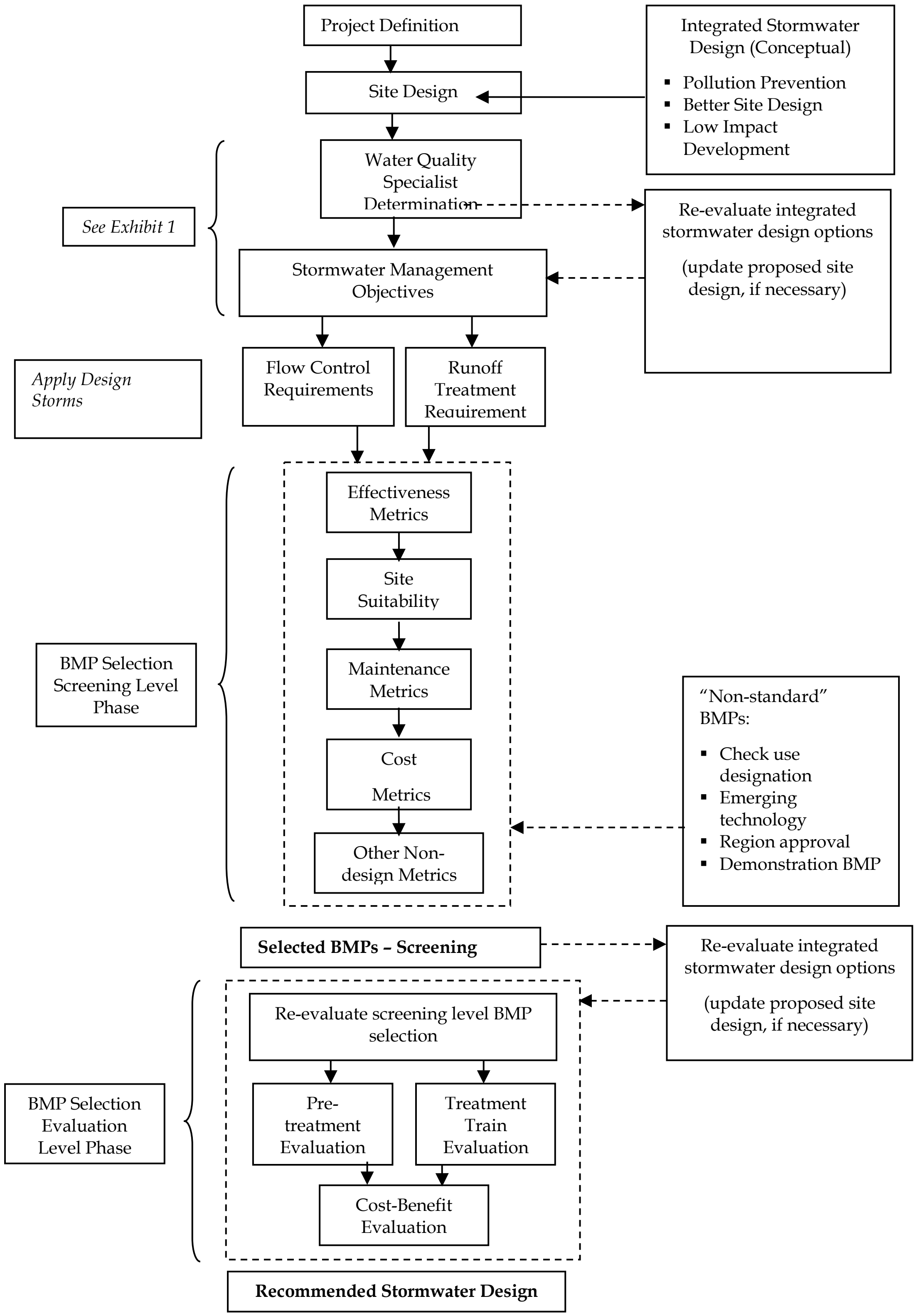


Figure 8. BMP Selection Process

3.3 BMPS IN THE SELECTION TOOL

This manual provides a focused effort on incorporating the commonly utilized BMPs by FHWA and HDOT, most identified in the HDOTs construction BMP Field Manual and Stormwater Permanent BMP Manual covering structural BMPs currently implemented on FHWA/HDOT projects. This effort hopes to build off of these BMP guidance manuals with additional suitable construction BMPs to promote consistent implementation of BMPs on transportation projects.

In addition to the structural BMPs, there are also non-structural, pollution prevention, and BSD/LID type BMPs, which essentially act to reduce the amount of pollution generation or pollution-carrying runoff. These BMPs are to be considered prior to the BMP Selection Tool step (see Figure 8).

FHWA and HDOT expects that the preferred BMPs included in the BMP Selection Tool will change as new technologies are developed and evaluated for their performance to meet HDOT standards and water quality treatment requirements. For the purposes of developing the guidance and tool, only these existing non-structural and structural BMPs, including engineered facilities are included in the BMP Selection Tool.

Other methods of treating stormwater runoff may be proposed but must be evaluated on a project-by-project basis to determine if the proposed treatment methods are adequate. A hydraulic design deviation request must be submitted to the hydraulics engineer for consideration. After an experimental BMP or Emerging Technology is approved for use on a specific FHWA/HDOT project it is placed on an evaluation list. The performance of all BMPs or Emerging Technologies placed on the evaluation list will be assessed and only the approved stormwater management approaches would be added to future revisions summarizing preferred BMPs utilized by FHWA and HDOT. In the interim, technical bulletins or memorandum may be published for the experimental emerging technologies for use by FHWA and HDOT engineers and consultants.

3.4 DEFINING TREATMENT EFFECTIVENESS USING TREATMENT MECHANISMS

The key issue with rating the "treatment effectiveness" of BMPs in the BMP Selection Tool is the wide range of removal efficiencies reported for the BMPs. One approach is to rate a BMP's treatment effectiveness based on the removal efficiencies reported in literature. However, the reported efficiencies vary greatly (e.g., at times from 20-80 percent removal by concentration). The wide range in removal efficiencies is a result primarily of the varying site conditions, influent concentrations, flow rates, and specific BMP designs. In addition, the number of studies reported in the literature for each BMP is still relatively limited, despite the development of such databases as the International BMP Database. Efforts to add to the dataset have so far not resulted in any clear increase in the precision of effectiveness data.

In an attempt to address this issue, FHWA, is proposing that treatment effectiveness be defined in terms of their "primary treatment mechanisms" rather than by removal efficiency data reported for specific BMPs. Primary treatment mechanism refers to the prevailing unit operations or processes (borrowing the term from the wastewater treatment field) that results in the removal or chemical breakdown of a given compound. The approach defines a given treatment mechanism as effectively treating a specific target pollutant, and if a BMP employs that treatment mechanism, then by definition the BMP would be considered effective at treating for the POC. Ratings of "high, medium, low" are used.

Types of Treatment Mechanisms. In general, a limited set of unit processes exist that different BMPs rely on to remove constituents from water. The reality of stormwater treatment is that the more complex unit processes, such as ultraviolet disinfection or chemical precipitation/flocculation, will generally not be used because of the economics of treating such large volumes of water.

The treatment effectiveness of a BMP is essentially related to which processes are actually utilized by the BMP and the ability of the BMP to maximize the process(es). Six primary treatment mechanisms are considered most appropriate for stormwater. The descriptions of these mechanisms are summarized below:

- **Hydrologic attenuation** – Hydrologic attenuation achieves pollutant reduction through runoff volume reduction. Infiltration is the primary means of hydrologic attenuation for the purposes of the types of BMPs used in stormwater management. Attenuation reduces the pollutant load discharged to surface waters, but does not necessarily reduce pollutant concentrations. Infiltration includes several different treatment mechanisms. Processes such as sorption, filtration, and microbial degradation occur as runoff infiltrates through the soil matrix.
- **Sedimentation/density separation** - Density separation refers to the unit processes of sedimentation and flotation that are dependent on the density differences between the pollutant and the water to effect removal. Sedimentation is the gravitational settling of particles having a density greater than water. Flotation is similar to gravitational sedimentation except in the opposite direction. Typically, floatable materials such as trash, debris, and hydrocarbons are removed through treatment processes that utilize the location of these pollutants on the water surface for removal. Stormwater treatment that incorporates vegetation and or permanent water bodies usually has a diverse microbial population, and it is not possible to optimize conditions for all beneficial species.
- **Sorption** - Sorption refers to the individual unit processes of both absorption and adsorption. Absorption is a physical process whereby a substance of one state is incorporated into another substance of a different state (e.g., liquids being absorbed by a solid or gases being absorbed by water). Adsorption is the physiochemical adherence or bonding of ions and molecules (ion exchange) onto the surface of another molecule. In stormwater treatment application, particularly for highway runoff, the primary pollutant types targeted with absorption unit processes are petroleum hydrocarbons, while adsorption processes typically target dissolved metals, nutrients, and organic toxicants such as pesticides and polycyclic aromatic hydrocarbons (PAHs). Different types of filter media may provide either or both of these unit processes.
- **Filtration** - Filtration can encompass a wide range of physical and chemical mechanisms, depending on the filtering media, typically some sand media,

natural soil, grassy vegetation, or mixes of chemically active ingredients such as perlite, zeolite, and granular activated carbon. Filtration removes particulate matter either on the surface of the filter or within the pore space of the filter. Filtration such as a sand filter can provide the added benefit of removing stormwater constituents that may be attached to solids such as metals and bacteria. Filtration can also provide opportunities for sorption processes to occur, reducing dissolved and fine suspended constituents. Filtration can often be an effective preliminary treatment for stormwater, by increasing the longevity of downstream BMPs and reducing maintenance frequency.

- **Uptake/Storage** - Uptake and storage refer to the removal of organic and inorganic constituents by plants and microbes through nutrient uptake and bioaccumulation. Nutrient uptake converts required micro- and macro-nutrients into living tissue. In addition to nutrients, various algae and wetland and terrestrial plants accumulate organic and inorganic constituents in excess of their immediate needs (bioaccumulation). The ability of plants to accumulate and store metals varies greatly. Significant metal uptake by plants will not occur unless the appropriate species are selected.
- **Microbially mediated transformation** – Microbial activity promotes or catalyzes redox reactions and transformations including degradation of organic and inorganic pollutants and immobilization of metals. Bacteria, algae, and fungi present in the soil or water column are primarily responsible for the transformations. Stormwater treatment that incorporates vegetation or permanent water pools usually has a diverse microbial population. These transformations can remove dissolved nitrogen species, metals, and simple and complex organic compounds. Soils may be inoculated with desirable microbes to promote specific reactions.

Table 1 summarizes the stormwater-related pollutants of concern considered to be effectively removed by each treatment mechanism.

Table 1. Treatment Mechanism- Target Pollutant Matrix		Mechanism					
		Hydrologic Attenuation [1]	Density Separation	Sorption (Chemical Activity)	Filtration	Uptake/Storage [2]	Microbial Transformation [3]
Target Pollutant	Sediment/Particulate (Suspended Solids)	■	■		■		
	Nutrients [4]	■	□	■		■	■
	Oil and Grease	■	■	■	■		■
	Polycyclic Aromatic Hydrocarbons (PAH)	■	□	■	□	■	■

	Metals (Particulate)	■	■		■		
	Metals (Dissolved)	■		■	□	□	□
■= Treatment mechanism effective for target pollutant removal							
□= Depending on chemical activity or filter media							
1 Refers to infiltration which is credited for overall pollutant mass load reduction of all target pollutants primarily through volume reduction; pollutant removal is also achieved through filtering, sorption, and microbial transformation in the soil column.							
2 Dependent on plant species							
3 Dependent on types of microbes present (in soil and water column)							
4 May not be considered a highway target pollutant but included for completeness							

3.5 Treatment Effectiveness Matrix

Based on information compiled in Table 2 relates the treatment mechanisms utilized by each of the BMPs included in the BMP Selection Tool. The table indicates whether the treatment mechanism is a key (or main) pollutant removal mechanism of the BMP, or whether it is a secondary (or “associated”) mechanism.

The lower portion of Table 3 cross references Table 2 with the current list of BMPs to identify which target pollutants are addressed by each BMP. The table indicates whether the BMP has high, moderate, or low capability of removing a target pollutant. The rating is largely a function of whether the BMP employs the key treatment mechanism identified to be effective at removing that particular pollutant. A BMP may be rated moderate or low for a target pollutant if the key treatment mechanism is a secondary process within the BMP. Alternatively, a BMP may be rated high for a target pollutant if at least one key treatment mechanism occurs as part of the BMP treatment process.

In application, this approach indicates that all of the BMPs included in the BMP Selection Tool are considered highly capable of removing particulates and total suspended solids, while infiltration, bioretention, bioslope, and constructed wetlands are the BMPs with high capability to remove dissolved metals. Porous pavements are also considered effective at removing dissolved metals, but are not considered to be stand-alone BMPs and will require the approval of the Pavement Engineer prior to use on a project. Soil-amended grass swales and filter strips, extended dry detention ponds and wet ponds, proprietary filtration facilities and media filters may also be moderately effective for dissolved metals. Similarly, the matrix can be used to identify which BMPs are considered effective in removing the other target pollutants.

Table 2. Treatment Mechanism-BMP Matrix

		Best Management Practice																
		Pre-treatment		Infiltration				Filtration				Pool-Ponds			Space-Constrained or Urban Application			
		Oil Control Facilities	Sediment Control	Infiltration Pond	Bioretention	Bioslope	Porous Pavement (Not stand-alone)	Grass Swale (soil amended)	Filter Strip (soil amended)	Grass Swale (no soil amendment)	Filter Strip (no soil amendment)	Constructed wetlands	Extended Detention Dry Pond	Wet Pond	Wet Vaults	Media Filters (non-proprietary)	Proprietary Separation	Proprietary Filtration Facilities
Treatment Mechanism	Hydrologic Attenuation			■	■	■	■	□	□	□	□	□	■	□				
	Density Separation (Sedimentation or Flotation)	■	■	□	□	□		□	□	□	□	■	■	■	■		■	
	Sorption	□		□	■	■		■	■	□	□	■	□	□		□	□	■
	Filtration	□	□	■	■	■		■	■	■	■	□	□	□		■	□	■
	Uptake/Storage[1]			□	■	□		□	□	□	□	■	□	□				
	Microbial Transformation[1]			□	■	□		□	□	□	□	■	□	□		□		□

		Oil Control Facilities	Sediment Control	Infiltration Pond	Bioretention	Bioslope	Porous Pavement (Not stand-alone)	Grass Swale (soil amended)	Filter Strip (soil amended)	Grass Swale (no soil amendment)	Filter Strip (no soil amendment)	Constructed wetlands	Extended Detention Dry Pond	Wet Pond	Wet Vaults	Media Filters (non-proprietary)	Proprietary Separation	Proprietary Filtration Facilities
Target Pollutant	Sediment/Particulate (TSS)	○	●	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●
	Nutrients	□	□	●	●	●	○	○	○	○	○	●	○	○		-		
	Oil and Grease	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○
	Polycyclic Aromatic Hydrocarbons (PAH)	□	□	●	●	●	○	○	○	○	○	●	○	○		○		
	Metals (Particulate)	○	○	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●
	Metals (Dissolved)	□		●	●	●	-	●	●	○	○	●	○	○		○		●

■ = Key treatment mechanism for BMP

□ = Associated treatment mechanism for BMP; dependent on plant species/ microbes present.

● = High capability to remove target pollutant

○ = Moderate capability to remove target pollutant

- = Low capability to remove target pollutant

1 Dependent on types of plant species or microbes (in soil and water column) present

Using "treatment mechanisms" (or unit processes) to define a BMP's effectiveness at removing target pollutants circumvents the need to rely strictly on the wide-ranging removal efficiency data for this purpose. It also allows for new BMPs to be easily integrated into the framework.

3.6 BMP Selection Tool – Metric Ratings

As noted above, the BMP Selection Tool includes metrics and ratings for treatment suitability (effectiveness) for POC, site suitability and physical constraints, maintenance needs and constraints, and costs. The draft ratings for the BMPs included in the BMP Selection Tool are summarized in Table 3.

Table 3. BMP Performance Summary Table

		Best Management Practice																
		Pretreatment		Infiltration				Filtration				Pool-Ponds			Space-Constrained or Urban Application			
		Oil Control Facilities	Sediment Control	Infiltration Pond	Bioretention	Bioslope	Porous Pavement (Not stand-alone)	Grass Swale (soil amended)	Filter Strip (soil amended)	Grass Swale (no soil amendment	Filter Strip (no soil amendment)	Constructed wetlands	Extended Detention Dry Pond	Wet Pond	Wet Vaults	Media Filters (non-proprietary)	Proprietary Separation (pretreatment)	Proprietary Filtration Facilities
Rank: ●=High ○=Medium - =Low blank=none/not applicable																		
Application to Stormwater Management Objectives [1]	Water Quality	-	-	○	●	●	○	●	●	●	●	●	○	○	○	●	●	●
	Channel Protection	□	□	●	●	○	●	-	-	-	-	●	●	○	●		□	
	Peak Discharge	□	□	●	●	○	●	-	-	-	-	●	●	●	●	-	□	□
	Recharge	□	□	●	○	●	●	-	-	-	-	-	-	-		□	□	□
Receiving Water Application [2]	Drinking Water Protection	-	-	-	○	○	-	○	○	○	○	●	○	●	●	●	●	●
	Aquatic Species Protection	-	-	●	○	●	●	○	○	○	○	●	○	○	○	○	-	-
	Water Quality Protection	-	-	●	●	●	●	○	○	○	○	●	○	●	-	○	●	●
	Wetlands Protection	-	-	○	○	●	○	○	○	○	○	●	○	●	-	-	-	-
	Sensitive Water Protection	-	-	○	○	●	○	-	-	-	-	○	○	●	-	-	-	-
Water Quality Treatment Effectiveness [3]	Sediment/Particulate (Suspended Solids)	○	●	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●
	Nutrients [4]	□	□	●	●	●	○	○	○	○	○	●	○	○		-		
	Oil and Grease	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○
	Polycyclic Aromatic Hydrocarbons (PAH)	□	□	●	●	●	○	○	○	○	○	●	○	○		○		

	Metals (Particulate)	○	○	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●
	Metals (Dissolved)	□		●	●	●	-	●	●	○	○	●	○	○		○		●
Rank: ⇧=large ⇔=medium ⇩=small blank=none/not applicable																		
Physical Site Suitability [4]	Surface Area (large is greater area)	⇩	⇩	⇔	⇩	⇔	⇩	⇔	⇔	⇔	⇔	⇧	⇧	⇧	⇩	⇔	⇩	⇩
	Drainage Area (large is greater area)	⇩	⇩	⇧	⇩	⇔	⇩	⇔	⇔	⇔	⇔	⇧	⇧	⇧	⇩	⇩	⇩	⇩
	Soil Infiltration Rate (large is higher rate)	□	□	⇧	⇧	⇧	⇧	⇔	⇔	⇔	⇔	⇩	⇩	⇩	□	□	□	□
	Slope (gradient)(large is steeper)	□	□	⇩	⇔	⇩	⇩	⇔	⇔	⇔	⇔	⇩	⇔	⇩	□	⇩	□	□
	Groundwater depth (large is deeper)	□	□	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇧	⇧	⇧	□	⇧	□	□
	Confined space/safety (large is greater required)	⇧	⇔	⇩	⇩	TBD	TBD	⇩	⇩	⇩	⇩	⇩	⇔	⇔	⇧	⇩	⇧	⇧
	Dependency on Soil Characteristics	□	⇩	⇧	⇧	⇔	⇧	⇔	⇔	⇔	⇔	⇧	⇧	⇧	□	□	□	□
Rank: H=High M=medium L=Low blank=none/not applicable																		
Maintenance Factors	Maintenance Level of Effort	M	M+	M+	M	TBD	TBD	L	L	L	L	L	M	M+	H	M	H+	H
	Frequency of Maintenance	M	M+	M+	M+	TBD	TBD	L	L	L	L	L	M	M+	H	M	H	H
	Reliability/Durability (Appurtenances)	M	L	L	L	TBD	TBD	L	L	L	L	L	L	M+	H	L	H	H
	Need for "Specialized" equipment	M	L	H	L	TBD	TBD	L	L	L	L	L	L	M	H	L	H+	H
	Operation and Maintenance Cost (Including Waste Disposal)	H	M+	H	M	TBD	TBD	L	L	L	L	H	M+	H	H	M	H+	H
Rank: +=Favorable /=Neutral -=Unfavorable blank=none/not applicable																		
Non-Design Factors	Community Acceptance	/	/	/	+	+	/	/	/	/	/	+	/	/	/	/	/	/
	Construction Cost	/	/	-	/	/	-	+	+	+	+	-	-	-	-	/	/	/
	Wildlife Habitat			/	+	/		/	/	/	/	+	/	+				

*See notes below for Rating Categories

Assumes soil amendments (compost; organic materials) are used to enhance pollutant removal and effectiveness

Assumes appropriate plantings (e.g. metal hyper-accumulating species) are used.

Notes:

1. Application to Stormwater Management Objectives
Water Quality – Objective for sites subject to water quality goals or requirements (see Matrix Receiving Water Application Component). In almost all cases, water quality objective is applicable. Specific water quality objectives are addressed further under Matrix Reciving Water Application Component.
Channel Protection – Objective for sites subject to channel protection requirements to protect streams.
Peak Discharge – Objective for sites subject to flood control. In almost all cases, flood control objective is applicable.
Recharge – Objective for sites subject to a recharge requirement to infiltrate runoff.
(1) Ratings (low, medium, high) are qualitative in nature and are based on a compilation of design criteria and effectiveness factors. These rating are to be applied in the context of comparing BMPs within the BMP selection process.

2. Receiving Water Application
Drinking water Protection – For groundwater; use the sensitive lakes category to define BMP design restrictions for surface water drinking supplies.

Aquatic Species Protection – minimizes channel erosion; provides channel protection; promotes baseflow; stream temperature.
Water Quality Protection – provides enhanced pollutant removal for TMDL/303(d) listed pollutants of concern (corresponds with Matrix Water Quality Treatment Effectiveness Component).
Wetlands Protection – maintains wetland hydroperiods and provides enhanced removal of nutrient (phosphorus) loads.
Sensitive Lakes Protection – provides enhanced removal of nutrient loads (primarily phosphorus).
***Rating Notes:*
High – provides positive benefits to meet needs under receiving water category.
Medium – provides limited benefit or is not a detriment to receiving water category.
Low – Potentially detrimental to receiving water category.

3. Water Quality Treatment Effectiveness
Based on treatment mechanisms documented in Table 2.
Data Sources:
NCHRP. 2006. Evaluation of Best Management Practices and Low Impact Development for Highway Runoff Control.
Portland Bureau of Environmental Services. 2006. Effectiveness Evaluation of Best Management Practices for Stormwater Management in Portland, Oregon.
Water Environment Research Federation. Undated. International Stormwater BMP Database. www.bmpdatabase.org

4. Physical Site Suitability
Surface Area – size of surface area BMP requires in terms of percentage total contributing surface area.
Surface Area Rating: Small <5%; Medium <10%, Large >10% of impervious area
Drainage Area – size of drainage area generally acceptable for the "conventional" application of the BMP.
Drainage Area Rating: Small < 2 acres; Medium <10 acres, Large >10 acres of drainage area
Soil Infiltration Rate – acceptable soil infiltration rates for optimum BMP performance.
Soil Infiltration Rate Rating: Small < 0.5 in/hr; Medium <2.5 in/hr; Large >2.5 in/hr
Slope (gradient) – acceptable site slopes/topography to construct BMP and allow proper function.
Slope Rating: Small <2%; Medium <5%; Large >5% slope
Groundwater level – depth to groundwater allowable for proper function of BMP
Groundwater Level Rating: Shallow/Small <10 ft below ground surface; Medium <50 ft bgs; Deep/Large >50 feet bgs
Dependency on Soil Characteristics – Dependency as it relates to maintaining treatment effectiveness.

5. Maintenance Factors

Based on data provided by ODOT staff and consideration of literature.
<u>Data Sources:</u>
NCHRP. 2006. Evaluation of Best Management Practices and Low Impact Development for Highway Runoff Control.

<u>6. Non-Design Factors</u>
Community acceptance – accounts for general sense of visual preference, reported nuisance problems, vegetative management; subjective in nature.
Construction Cost – general cost rating to construct the BMP. Rating should not preclude preparing design-level engineering cost estimates when evaluating the preferred alternative.
Wildlife Habitat – provides potential habitat for wildlife.
***Ratings (favorable, neutral, unfavorable) are qualitative in nature and are based on a compilation of information from references on these factors. The rating is to be applied in the context of comparing BMPs within the BMP selection process.*

CHAPTER 4:

4 CONSTRUCTION SITE BEST MANAGEMENT PRACTICES

A critical next step in protecting water quality is the implementation of stormwater, non stormwater, and waste management control BMPs during construction. Construction Site BMPs are applied during construction activities to reduce the pollutants in storm water discharges throughout construction. These Construction Site BMPs provide both temporary erosion and sediment control. There are six categories of BMPs suitable for temporary erosion and sediment control on construction sites. They are:

- Soil Stabilization Practices;
- Sediment Control Practices;
- Tracking Control Practices;
- Wind Erosion Control;
- Non-storm Water Controls; and
- Waste Management and Material Pollution Controls.

It is generally accepted that practices that perform well by themselves can be complemented by other practices to raise the collective level of erosion control effectiveness and sediment retention. Effective erosion and sediment control planning relies on a system of BMPs (e.g., mulches for source control, fiber rolls on slopes for reducing runoff velocities, silt fence at the toe of slopes for capturing sediment, etc.) which is commonly referred to as a treatment train.

The greatest water pollution threat from soil-disturbing activities is the introduction of sediment from the construction site into storm drain systems or natural receiving waters. Soil-disturbing activities such as clearing, grading, grubbing, and earthwork increase the exposure of soils to wind, rain, and concentrated flows that cause erosion. A three-pronged approach is necessary to combat this storm water threat:

- Temporary soil stabilization practices reduce erosion associated with disturbed soil areas (DSAs).
- Temporary run-on control practices prevent storm water flows (sheet and concentrated) from contacting DSAs.
- Temporary sediment control practices reduce sediment caused by erosion from entering a storm drain system or receiving water.

Soil stabilization BMPs reduce the erosive impact of rain on exposed soil. Run-on control practices reduce the erosive impacts by preventing storm water flows from contacting DSAs. Sediment control BMPs remove sediment from storm water by ponding and settling, and/or filtering prior to discharge offsite. It is imperative that soil stabilization and sediment control BMPs are implemented together to reduce the discharge of sediment from the construction site.

The following conditions on construction sites contribute to erosion caused by storm water flows:

- Larger areas of impermeable structures and surfaces reduce natural infiltration resulting in increased storm water flow volume and velocity.
- Changes to surface flow patterns cause storm water flows to be more erosive.
- Concentration of flows to areas that are not naturally subjected to such runoff volume increases erosion.

Proper management of a construction project minimizes or prevents soil erosion and sediment discharges. Good construction management for soil conservation requires an understanding of the following basic principles:

Soil Erosion Control – The First Line of Defense

Soil stabilization is a key component in the control of erosion. By stabilizing DSAs with covers or binders, the exposed soils are less likely to erode from the effects of wind or rain.

Prevent Storm Water Flows from Contacting DSAs – The Second Line of Defense

Another key component in the control of erosion is the diversion of storm water flows around DSAs or the conveyance of flows through DSAs in a non-erosive manner.

Sediment Control – The Last Line of Defense

Storm water runoff may originate from active or inactive DSAs whether or not proper erosion and/or run-on controls have been implemented. Implementing proper sediment control BMPs can reduce sediment amounts in storm water discharges.

Combine Soil Erosion and Sediment Control – Effective Protection

An effective combination of soil erosion and sediment controls should be implemented to prevent sediment from leaving the site and/or entering a storm water drainage system or receiving water.

Soil stabilization and other erosion control BMPs are not 100 percent effective at preventing erosion. Soil erosion control BMPs must be supported by sediment control BMPs to capture sediment on the construction site.

Sediment control BMPs alone are not 100 percent effective primarily due to their capacity limits. To be effective for storm water protection, the amount of sediment must be reduced at the source using soil erosion control BMPs, and then sediment control BMPs are used to further reduce the sediment that leaves the site or enters the storm drain system.

Inspection and Maintenance – Ensure Protection for the Duration of the Project

Inspection and maintenance are required for all BMPs (soil stabilization, run-on control, and sediment control) to maintain effectiveness for reducing or eliminating the amount of sediment that leaves a site.

Post Construction

The key to getting the post-project site to function (from a stormwater runoff standpoint) similar to a natural, undisturbed site is to restore the functionality that has been removed. In general, the successful and sustainable erosion control solution addresses:

1. Soil Cover:

   Bare soil requires the protective cover provided by a mulch product (bark mulch, compost blanket, pine needles, straw, duff) or hydroseeding. These products protect the soil surface from erosion due to raindrop impact and sheet flow.

2. Healthy Soil:

   Healthy soils maintain stormwater quality and control erosion by their open structure that facilitates infiltration of runoff, and by providing the nutrients and soil biota necessary to support long-term sustainable vegetative cover. To maintain stormwater quality, disturbed roadsides that feature highly compacted sterile soils typically require de-compaction and/or incorporation of organics such as compost to restore soil health.

3. Sustainable Vegetation:

   Sustainable vegetation is dependent upon selecting the proper mixture of plant types (grass, annual, perennial, forb, cutting, sod, liner, woody shrub) and species for specific site environmental conditions (geographic location, elevation, exposure, soil type). The short-term goal is to quickly establish vegetative cover to provide protection from raindrop impact and sheet-flow erosive forces. The long-term goal is to establish healthy mature vegetation that requires minimal replanting, supplemental water, or maintenance.

An erosion control solution that ensures that well drained soil including organic material and healthy soil biota, a surface mulch layer of duff/mulch, together with regionally appropriate plant material mimics the functionality of the natural environment, and with time should perform in a similar manner - protecting water quality and managing the runoff rate and volume.

4.1 Construction Operations and Applicable Best Management Practices Matrix

Prior to any ground disturbing activities, the physical condition of the construction site and adjacent areas should be reviewed by members of the PDT and Contractor Construction Staff. A project design package showing what is being constructed, limits of construction, avoidance areas/ sensitive areas, project schedule, and contract requirements will be provided to contractor. Site characteristics including drainage patterns, soils, vegetation, surface water bodies, and steep or unstable slopes should be noted. If available, the hydrology report, soils report, and a grading/drainage plan should also be consulted. Physical conditions at the site will change as construction progresses; BMP application should change accordingly to ensure effective protection is maintained throughout construction milestones.

To meet regulatory requirements and protect the site resources, every project must include an effective combination of erosion and sediment control measures within the SWPPP/IWPPP. These measures must be selected from all of the BMP categories presented in this section: soil stabilization practices, sediment control practices, tracking control practices, and wind erosion control practices. Additionally, the project plan must include non-storm water controls, waste management and material pollution controls. These practices are identified in the erosion control plan, also known as the SWPPP.

The SWPPP/IWPPP is more than just and erosion control plan. A SWPPP is a tool that aids in managing pollution during construction. A SWPPP is a written documents that describe the pollution prevention practices and activities that will be implemented on the site. It includes descriptions of the site and of each major phase of the planned activity, the roles and responsibilities of contractors and subcontractors, procedures that will be implemented to comply with the terms and conditions of the construction general permit and the inspection schedule and logs. It is also a place to document changes and modifications to the construction plans and associated stormwater pollution prevention activities.

Also, SWPPPs are designed to be amended whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for discharge of pollutants to surface WUS, state or a MS4. The SWPPP is also amended if BMPs prove to be ineffective in managing POCs from sources identified during inspection, or when any new contractor and/or subcontractor will implement any measure of the SWPPP. All amendments are signed, dated, and kept as attachments to the original SWPPP. This ensures that SWPPPs are kept up to date with changes on the construction site.

However, historically many key construction permit applications (including the 404 and 401-water quality certifications) have required that a list of appropriate BMPs proposed for a specific project, along with the required site plan, description, and location of those BMPs be provided. A common issue with this approach is that a construction contractor has not been selected at the time of issuance for these permits. To address this, the project designer provides layout sheets showing the suggested locations of Construction Site BMPs. The purpose of these sheets is to show the contractor the designer's anticipated placement of Construction Site BMPs such as contractor staging areas, approximate location of concrete washouts, approximate locations for storage of materials, and preferred locations for vehicle and equipment maintenance. However, the contractors input into the layout are unavailable during development. Typically, these layouts are not highly detailed drawings and are commonly drawn on l:200 and l:500 scale. Where multiple stages of construction are anticipated, the designer attempts to show the various stages of construction and how the deployment of the BMPs is expected to change over time. These locations and layouts will be, in most cases, subject to the contractor's phasing of the work and timing of operations. As a result, many of the suggested locations are immediately modified by the contractor in the SWPPP/IWPPP as construction phasing is identified.

Contractors and designers need to carefully think through many factors to choose the most appropriate, effective and feasible practice(s) at a construction site that will best meet Federal, state and local stormwater and water quality objectives. Rather than relying on the suggested temporary BMP locations, and acknowledging the Contractor is ultimately responsible for developing a SWPPP that complies with the Permit, FHWA is attempting to factor in more flexibility into BMP selection.

Proper BMP selection requires that a stormwater manager select those BMPs most able to address an identified pollution source. Selecting an inappropriate BMP for a site could lead to adverse resource impacts, friction with regulators if a BMP does not work as anticipated, misperceptions about stormwater control success, and wasted time and money. Careful selection of BMPs will prevent negative impacts from installing the wrong BMP at the wrong location. .

The number, location and type of applicable BMPs is variable and depends on project design and generally must be determined on a case by-case basis. There is no minimum number of practices that are appropriate to various projects. Following permit approval, it is common that BMPs need to be modified as a contractor develops their methods and means of construction on the project. This commonly requires that BMPs be modified, moved, or substituted to ensure they continue to meet project goals. The SWPPP is a living document and must be developed or amended to address conditions as activities change at the site. The utilization of preferred construction BMPs from six control categories allows improved coordination with the contractor during the development of the SWPPP and adaptive management of BMPs during construction as one preferred construction BMPs is substituted for another in the SWPPP/IWPPP rather than being static.

The goal of the below matrices is to allow a suite of preferred construction BMPs to be identified during the permitting process. Following permit approvals, the PDT including contractors can then use the project design specifications to refine the BMP list in the project site plan of the SWPPP/IWPPP. This approach allows projects to adaptively manage project BMPs as site conditions change, construction phasing changes or construction milestones are reached.

The BMP Matrices in this section cross-reference individual BMPs with the most common construction activities that can release pollutants. Therefore, in Table 4 the horizontal axis of the matrix (across the top) lists typical highway construction activities. The BMPs appropriate for those construction activities are listed on the vertical axis (down the left hand side of the page). This table groups BMPs with major construction operations which will assist with BMP management during construction phasing.

The matrix in Table 5 further refines the construction BMPs by grouping BMPs into BMP categories including: soil stabilization practices, sediment control practices, tracking control practices, and wind erosion control practices, non-storm water controls, waste management and material pollution controls. These BMP categories are cross referenced against typical highway construction activities.

Detailed descriptions and guidance regarding implementation of these BMPs may be found in the Construction BMP Field Manual (Appendix A), CFLHD Design Standards (Appendix E) or the Clear Water Diversion and Isolation Techniques (Chapter 5) which summarizes additional BMPs suitable for construction activities in, over or adjacent to water or when water diversion and isolation techniques are required to complete the necessary construction activities.

The BMP Matrix includes the best information available to the FHWA and HDOT at this time regarding practices known to be appropriate for transportation projects. It is anticipated that this manual will be revised and supplemented in subsequent reviews of available BMP technologies. The list of BMPs provided in the matrix is not intended to be exhaustive. Rather, it is intended that members of the PDT may select BMPs other than those included in the BMP Matrix, so long as they treat the same POC and are an appropriate BMP for the particular construction activity.

The matrix format in Table 4 and 5 reflects the fact that there are a variety of BMPs that may be appropriate for a given project and that each project's circumstances are unique. The matrix identifies the most likely BMPs appropriate for different types of projects and for different types of pollutant scenarios. It also assists the PDT in determining if a specific BMP is not appropriate to a specific scenario. The individual BMPs designated by an “X” in Table 5 have been identified as applicable to a particular typical construction activity, but will not necessarily be appropriate for all projects involving the noted activity. For example, not all projects will have on-site vehicle fueling and maintenance operations; however, those that do will be required to conduct those operations in a manner consistent with the intent of the BMP description (Appendix A, Appendix E). These tables can assist construction staff to determine if a proposed practice is actually applicable to the desired pollution prevention or environmental protection outcome. It is intended to be a flexible tool.

Table 4. Storm Water BMPs for Construction Operations

Construction Operation	BMP Category	BMPs
Mobilization	Sediment Control	Street Sweeping and Vacuuming
	Tracking Control	Stabilized Construction Entrance/Exit
		Stabilized Construction Roadway
		Entrance/Outlet Tire Wash
	Non-Stormwater Control	Illicit Connection / Illegal Discharge Detection and Reporting
	Waste Management and Materials Pollution Control	Material Delivery and Storage
		Material Use
		Spill Prevention and Control
		Solid Waste Management
		Hazardous Waste Management
		Sanitary/Septic Waste Management
Clearing/Grubbing	Soil Stabilization	Scheduling
		Preservation of Existing Vegetation
		Hydraulic Mulch
		Hydroseeding
		Soil Binders
		Straw Mulch
		Geotextiles, Plastic Covers & Erosion Control Blankets/Mats
		Wood Mulching
		Earth Dikes/Drainage Swales & Lined Ditches
		Outlet Protection/Velocity Dissipation Devices
		Slope Drains
	Sediment Control	Silt Fence
		Desilting Basin
		Sediment Trap/ Filter bags
		Check Dam
		Fiber Rolls
		Gravel Bag Berm
		Street Sweeping and Vacuuming
		Sandbag Barrier
		Straw Bale Barrier
		Storm Drain Inlet Protection
	Wind Erosion Control	Wind Erosion Control
	Non-Stormwater Management	Water Conservation Practices
		Vehicle and Equipment Cleaning
		Vehicle and Equipment Fueling
		Vehicle and Equipment Maintenance
	Waste Management and Materials Pollution Control	Stockpile Management
		Solid Waste Management
		Contaminated Soil Management

Table 4. Storm Water BMPs for Construction Operations

Construction Operation	BMP Category	BMPs
Earthwork	Soil Stabilization	Scheduling
		Preservation of Existing Vegetation
		Hydraulic Mulch
		Hydroseeding
		Soil Binders
		Straw Mulch
		Geotextiles, Plastic Covers & Erosion Control Blankets/Mats
		Wood Mulching
		Earth Dikes/Drainage Swales & Lined Ditches
		Outlet Protection/Velocity Dissipation Devices
		Slope Drains
	Sediment Control	Silt Fence
		Desilting Basin
		Sediment Trap / Filter bags
		Check Dam
		Fiber Rolls
		Gravel Bag Berm
		Street Sweeping and Vacuuming
		Sandbag Barrier
		Straw Bale Barrier
		Storm Drain Inlet Protection
	Tracking Control	Stabilized Construction Entrance/Exit
	Wind Erosion Control	Wind Erosion Control
	Non-Stormwater Management	Temporary Stream Crossing
		Vehicle and Equipment Cleaning
		Vehicle and Equipment Fueling
		Vehicle and Equipment Maintenance
	Waste Management and Materials Pollution Control	Contaminated Soil Management
Portland Cement Concrete and Asphalt / Concrete Operations	Sediment Control	Street Sweeping and Vacuuming
	Tracking Control	Stabilized Construction Entrance/Exit
	Non-Stormwater Management	Paving and Grinding Operations
	Waste Management and Materials Pollution Control	Material Delivery and Storage
		Material Use
		Stockpile Management
		Solid Waste Management
		Concrete Waste Management
Drainage Work	Sediment Control	Desilting Basin
		Sediment Trap / Filter bags
		Check Dam
		Storm Drain Inlet Protection
	Soil Stabilization	Earth Dikes/Drainage Swales & Lined Ditches

Table 4. Storm Water BMPs for Construction Operations

Construction Operation	BMP Category	BMPs
		Outlet Protection/Velocity Dissipation Devices
Dewatering Operations	Non-Stormwater Management	Dewatering Operations
Bridge Construction	Non-Stormwater Management	Water Conservation Practices
		Paving and Grinding Operations
		Temporary Stream Crossing
		Clear Water Diversion and Isolation Techniques
		Vehicle and Equipment Cleaning
		Vehicle and Equipment Fueling
		Vehicle and Equipment Maintenance
	Waste Management and Materials Pollution Control	Material Delivery and Storage
		Material Use
		Stockpile Management
		Spill Prevention and Control
		Solid Waste Management
		Hazardous Waste Management
		Concrete Waste Management
		Liquid Waste Management
	Non-Stormwater Control	Paving and Grinding Operations
		Temporary Stream Crossing
		Clear Water Diversion and Isolation Techniques
Roadway Construction	Waste Management and Materials Pollution Control	Material Delivery and Storage
		Material Use
		Stockpile Management
		Solid Waste Management
		Hazardous Waste Management
		Concrete Waste Management
		Liquid Waste Management
Mobile Operations	Sediment Control	Street Sweeping and Vacuuming
		Storm Drain Inlet Protection
	Tracking Control	Stabilized Construction Entrance/Exit
	Non-Stormwater Control	Vehicle and Equipment Cleaning
		Vehicle and Equipment Fueling
		Vehicle and Equipment Maintenance
	Waste Management and Materials Pollution Control	Material Delivery and Storage
		Material Use
		Stockpile Management
		Solid Waste Management
		Hazardous Waste Management
		Concrete Waste Management
Trenching Operations	Sediment Control	Street Sweeping and Vacuuming
		Storm Drain Inlet Protection

Table 4. Storm Water BMPs for Construction Operations

Construction Operation	BMP Category	BMPs
	Waste Management and Materials Pollution Control	Stockpile Management
Erosion Control, Highway Planting and Landscaping	Soil Stabilization	Scheduling
		Preservation of Existing Vegetation
		Hydraulic Mulch
		Hydroseeding
		Soil Binders
		Straw Mulch
		Geotextiles, Plastic Covers & Erosion Control Blankets/Mats
		Wood Mulching
		Earth Dikes/Drainage Swales & Lined Ditches
		Outlet Protection/Velocity Dissipation Devices
	Sediment Control	Silt Fence
		Street Sweeping and Vacuuming
		Sandbag Barrier
		Straw Bale Barrier
		Storm Drain Inlet Protection
	Wind Erosion Control	Wind Erosion Control
	Non-Stormwater Control	Potable Water/Irrigation
		Vehicle and Equipment Cleaning
	Waste Management and Materials Pollution Control	Material Delivery and Storage
		Material Use

Table 5: Construction Site BMPs By Construction Activity

	Typical Highway Construction Activities																											
	Demolish Pavement/Structure	Clear and Grub	Construct Access Roads	Grading (including cut and fill slopes)	Channel Excavation	Channel Paving	Trenching/ Underground Drainage	Underground Drainage Facility Installation	Drainage Inlet Modification	Utility Trenching	Utility Installation	Subgrade Preparation	Base Paving	Asphalt Concrete Paving	Concrete Paving	Saw Cutting	Joint Sealing	Grind/Groove	Structure Excavation	Erect Falsework	Bridge/Structure Construction	Remove Falsework	Striping	Miscellaneous Concrete Work	Sound Walls/Retaining Walls	Planting and Irrigation	Contractor Activities	Treatment BMP Construction
Best Management Practices																												
Temporary Sediment Control																												
Silt Fence	X	X	X	X	X		X			X		X							X		X					X		X
Sandbag Barrier	X	X	X	X	X		X			X		X							X		X					X		X
Straw Bale Barrier	X	X	X	X	X		X			X		X							X		X					X		X
Fiber Rolls	X	X	X	X	X		X			X											X					X		X
Gravel Bag Berm	X	X	X	X	X		X			X											X					X		X
Check Dam	X	X		X	X		X																					X
Desilting Basin	X	X	X	X	X																X					X		X
Sediment Trap / Filter Bags	X	X	X	X	X		X			X		X							X		X					X		X
Sediment Basin		X		X	X																X					X		X
Temporary Soil Stabilization																												
Hydraulic Mulch	X	X		X	X																X					X		X
Hydroseeding	X	X		X	X																X					X		X
Soil Binders	X	X		X	X														X		X					X		X
Straw Mulch	X	X	X	X	X		X	X		X		X							X		X					X		X
Geotextiles, Mats/Plastic Covers and Erosion Control	X	X	X	X	X		X	X		X		X							X		X					X		X

Table 5: Construction Site BMPs By Construction Activity

	Typical Highway Construction Activities																											
	Demolish Pavement/Structure	Clear and Grub	Construct Access Roads	Grading (including cut and fill slopes)	Channel Excavation	Channel Paving	Trenching/ Underground Drainage	Underground Drainage Facility Installation	Drainage Inlet Modification	Utility Trenching	Utility Installation	Subgrade Preparation	Base Paving	Asphalt Concrete Paving	Concrete Paving	Saw Cutting	Joint Sealing	Grind/Groove	Structure Excavation	Erect Falsework	Bridge/Structure Construction	Remove Falsework	Striping	Miscellaneous Concrete Work	Sound Walls/Retaining Walls	Planting and Irrigation	Contractor Activities	Treatment BMP Construction
Best Management Practices																												
Scheduling	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X
Preservation of Existing Vegetation		X	X	X			X	X		X									X	X		X			X			
Temporary Concentrated Flow Conveyance Controls																												
Earth Dikes/Drainage Swales & Lined Ditches		X	X	X																	X							
Outlet Protection/Velocity Dissipation Devices		X	X	X																	X							
Slope Drains				X																	X							
Temporary Stream Crossing			X				X	X		X	X									X	X	X		X				
Clear Water Diversion and Isolation Techniques	X		X		X	X														X	X	X			X			X
Wind Erosion Control		X	X	X	X		X			X		X	X	X	X											X		X
Sediment Tracking Control	X	X	X	X	X		X	X		X	X	X	X	X	X	X		X	X		X				X	X	X	X

Table 5: Construction Site BMPs By Construction Activity

	Typical Highway Construction Activities																											
	Demolish Pavement/Structure	Clear and Grub	Construct Access Roads	Grading (including cut and fill slopes)	Channel Excavation	Channel Paving	Trenching/ Underground Drainage	Underground Drainage Facility Installation	Drainage Inlet Modification	Utility Trenching	Utility Installation	Subgrade Preparation	Base Paving	Asphalt Concrete Paving	Concrete Paving	Saw Cutting	Joint Sealing	Grind/Groove	Structure Excavation	Erect Falsework	Bridge/Structure Construction	Remove Falsework	Striping	Miscellaneous Concrete Work	Sound Walls/Retaining Walls	Planting and Irrigation	Contractor Activities	Treatment BMP Construction
Best Management Practices																												
Street Sweeping and Vacuuming	X	X	X	X	X		X	X		X	X	X	X	X	X	X		X	X		X				X	X	X	X
Stabilized Construction Roadway		X	X	X																								
Entrance/Outlet Tire Wash		X	X	X																						X	X	
Waste Management																												
Spill Prevention and Control	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Solid Waste Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hazardous Waste Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Contaminated Soil Management	X	X		X			X	X		X	X									X								
Concrete Waste Management	X		X			X		X			X		X		X	X		X	X		X			X	X	X	X	X
Sanitary/Septic Waste Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Liquid Waste Management														X		X	X		X		X		X				X	X

Table 5: Construction Site BMPs By Construction Activity

	Typical Highway Construction Activities																											
	Demolish Pavement/Structure	Clear and Grub	Construct Access Roads	Grading (including cut and fill slopes)	Channel Excavation	Channel Paving	Trenching/ Underground Drainage	Underground Drainage Facility Installation	Drainage Inlet Modification	Utility Trenching	Utility Installation	Subgrade Preparation	Base Paving	Asphalt Concrete Paving	Concrete Paving	Saw Cutting	Joint Sealing	Grind/Groove	Structure Excavation	Erect Falsework	Bridge/Structure Construction	Remove Falsework	Striping	Miscellaneous Concrete Work	Sound Walls/Retaining Walls	Planting and Irrigation	Contractor Activities	Treatment BMP Construction
Best Management Practices																												
Materials Handling																												
Material Delivery, and Storage	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Material Use	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vehicle and Equipment Operations																												
Vehicle and Equipment Cleaning	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vehicle and Equipment Fueling	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vehicle and Equipment Maintenance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Paving Operations			X			X			X				X	X	X	X	X	X			X							
Stockpile Management	X		X					X		X	X		X	X	X			X										
Water Conservation Practices	X	X	X	X	X	X	X	X	X	X		X				X	X	X	X		X			X		X	X	X

Table 5: Construction Site BMPs By Construction Activity

	Typical Highway Construction Activities																											
	Demolish Pavement/Structure	Clear and Grub	Construct Access Roads	Grading (including cut and fill slopes)	Channel Excavation	Channel Paving	Trenching/ Underground Drainage	Underground Drainage Facility Installation	Drainage Inlet Modification	Utility Trenching	Utility Installation	Subgrade Preparation	Base Paving	Asphalt Concrete Paving	Concrete Paving	Saw Cutting	Joint Sealing	Grind/Groove	Structure Excavation	Erect Falsework	Bridge/Structure Construction	Remove Falsework	Striping	Miscellaneous Concrete Work	Sound Walls/Retaining Walls	Planting and Irrigation	Contractor Activities	Treatment BMP Construction
Best Management Practices																												
Potable Water/Irrigation																												
Dewatering Operations	X			X	X	X	X	X	X	X	X								X		X			X	X	X		X
Illicit Connection/Illegal Discharge Detection and																												
Storm Drain Inlet Protection	X	X	X	X	X		X	X	X	X		X	X			X	X	X	X								X	X
Stabilized Construction Entrance/Exit		X	X	X																						X		X

X BMP may be applicable to activity

4.2 Construction BMPs

Specifications for construction BMPs can be found in FHWA FP 14 Standard Specifications and HDOT Construction BMP Field Manual (Appendix A) and CFLHD Standard Details (Appendix E).

4.2.1 Soil Stabilization BMPs

Examples of Temporary Soil Stabilization BMPs include:

- Scheduling;
- Preservation of Existing Vegetation;
- Hydraulic Mulch;
- Hydroseeding;
- Soil Binders;
- Straw Mulch;
- Geotextiles, Plastic Covers and Erosion Control Blankets;
- Wood Mulching;
- Earth Dikes/Drainage Swales and Ditches;
- Outlet Protection/Velocity Dissipation Devices; and
- Slope Drains.

Provided on Table 5 are selection criteria information and ratings for temporary soil stabilization BMPs. The BMPs are described in detail following Table 6.

Table 6: Temporary Soil Stabilization Criteria Matrix

CLASS	TYPE	TEMPORARY SOIL STABILIZATION CONTROL CRITERIA													
		Antecedent Moisture	Availability	Ease of Clean-Up	Installed Cost Per Ha	EC Effectiveness (%)	Degradability	Length of Drying Time (hrs)	Time to Effectiveness (days)	Longevity	Mode of Application	Residual Impact	Native	Runoff Effect	Water Quality Impact
CATEGORY: STANDARD BIODEGRADABLE MULCHES (SBM)															
Straw Mulch	Wheat Straw	D	S	H	$5,200	90-95	B	0	1	M	L/M	M		+	M
	Rice Straw	D	S	H	$5,200	90-95	B	0	1	M	L/M	M		+	L
Wood Fiber Mulch	Wood Fiber	D	S	H	$2,200	50-60	B	0-4	1	M	H	L		+	M
Recycled Paper Mulch	Cellulose Fiber	D	S	H	$2,100	50-60	B	0-4	1	S	H	L		+	L
Bonded Fiber Matrix	Biodegradable	D	S	H	$13,600	90-95	B	12-18	1	M	H	M		+	H
CATEGORY: ROLLED EROSION CONTROL PRODUCTS (RECP)															
Biodegradable	Jute Mesh	D	S	H	$16,000	65-70	B		1	M	L	M		+	UNK
	Curled Wood Fiber	D	S	H	$26,000	85-90	P/B		1	M	L	M		+	L
	Straw	D	S	H	$22,000	85-90	P/B		1	M	L	M		+	H
	Wood Fiber	D	S	H	$22,000	85-90	P/B		1	M	L	M		+	L
	Coconut Fiber	D	S	H	$32,000	90-95	P/B		1	L	L	M		+	L
	Coconut Fiber Mesh	D	S	H	$77,000	85-90	B		1	L	L	M		+	UNK
	Straw Coconut Fiber	D	S	H	$27,000	90-95	P/B		1	L	L	M		+	M
Non-Biodegradable	Plastic Netting	D	M	H	$5,000	<50	P		1	L	L	H		+	UNK
	Plastic Mesh	D	M	H	$8,000	75-80	P		1	L	L	H		+	UNK
	Synthetic Fiber with Netting	D	M	H	$86,000	90-95	P		1	L	L	H		+	UNK
	Bonded Synthetic Fibers	D	M	H	$121,000	90-95	P		1	L	L	H		+	UNK
	Combination with Biodegradable	D	M	H	$79,000	85-90	P		1	L	L	H		+	UNK
CATEGORY: TEMPORARY SEEDING (TS)															
High-Density	Ornamentals		S-M	H	$1000 - $4000	50-60			28	M-L	H	L-M	N/E	+	UNK

	Turf species		S	H	$900	50-60			28	L	H	M-H	N/E	+	UNK
	Bunch grasses		S-M	H	$750 - $3200	50-60			28	L	H	L-M	N	+	UNK
Fast-Growing	Annual		S	H	$900 - $1,600	50-60			28	L	H	L-H	N/E	+	UNK
	Perennial		S	H	$800 - $2000	50-60			28	L	H	M	N/E	+	UNK
Non-Competing	Native		S-M	H	$700 - $4000	50-60			28	L	H	L-M	N	+	UNK
	Non-Native		S-M	H	$1000 - $1200	50-60			28	L	H	L-H	E	+	UNK
Sterile	Cereal Grain		S	H	$1,200	50-60			28	L	H	L	E	+	UNK
CATEGORY: IMPERVIOUS COVERS (IC)															
Plastic	Rolled Plastic Sheeting		S		$17,000	100	P		1	M	L	H		-	UNK
	Geotextile (Woven)		S		$14,800	90-95	P		1	M	L	H		-	UNK
CATEGORY: HYDRAULIC SOIL STABILIZERS (HSS)															
(PBS) Plant Material Based- Short Lived	Guar	D	S	H	$1,000	80-85	B	12-18	Same as Length of	S	B	L		0/+	M/L
	Psyllium	P	S	H	$1,000	25-35	B	12-18		M	B	L		0	L/H
	Starches	D	S	H	$1,000	25-30	B	9-12		S	H	L		0	L
(PBL) Plant Material Based- Long Lived	Pitch/ Rosin Emulsion	D	S	M	$3,000	60-75	B	19-24		M	B	M		-	H
(PEB) Polymeric Emulsion Blends	Acrylic polymers and copolymers	D	S	M	$3,000	35-70	P/C	19-24		L	B	M		+/-	L/M
	Methacrylates and acrylates	D	M	M	$1,000	35-40	P/C	12-18		S	W	L		0/+	L
	Sodium acrylates and acrylamides	D	M	M	$1,000	20-70	P/C	12-18		S	H	L		+/-	L/M
	Polyacrylamide	D	M	M	$1,000	55-65	P/C	4-8		M	H	L		0/+	L
	Hydro-colloid polymers	D	M	H	$1,000	25-40	P/C	0-4		M	H	L		0/+	L/M
(PRB) Petroleum/ Resin-Based Emulsions	Emulsified Petroleum Resin	D	M	L	$3,000	10-50	P/C	0-4		M	B	M		0/-	H
(CBB) Cementitious Based Binders	Gypsum	D	S	M	$2,000	75-85	P/C	4-8		M	H	L		-	M/H

Antecedent Moisture	D P	Soil should be relatively dry before application Soil should be pre-wetted before application
Availability	S M	A short turn-around time between order and delivery, usually 3-5 days A moderate turnaround time, between 1-2 weeks
Ease of Clean-Up	L M H	Require pressure washing, a strong alkali solution, or solvent to clean up Requires cleanup with water while wet; more difficult to clean up once dry May be easily removed from equipment and overspray areas by a strong stream of water
Installed Cost		Dollars per hectare
Degradability	C P B	Chemically degradable Photodegradable Biodegradable
Length of Drying Time		Estimated hours
Time to Effectiveness		Estimated days
Erosion Control Effectiveness		Percent reduction in soil loss over bare soil condition.
Longevity	S M L	1 - 3 months 3 – 12 months > than 12 months

Application Mode	L W H B M	Applied by hand labor Applied by water truck Applied by hydraulic mulcher Applied by either water truck or hydraulic mulcher Applied by a mechanical method other than those listed above (e.g., straw blower)
Residual Impact	L M H	Projected to have a low impact on future construction activities Projected to have a moderate impact on future construction activities Projected to have a significant impact on future construction activities
Native	N E	Plant or plant material native to the State of Hawaii Exotic plant not native to the State of Hawaii
Runoff Effect	+ 0 -	Runoff is decreased over baseline (bare soil) No change in runoff from baseline Runoff is increased over baseline
Water Quality Impact	L M H	Low potential to impact water quality Moderate potential to impact water quality Higher potential to impact water quality

4.2.1.1 Scheduling

This BMP involves developing, for every project, a schedule that includes sequencing of construction activities with the implementation of Construction Site BMPs such as temporary soil stabilization (erosion control) and temporary sediment control measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

4.2.1.2 Preservation of Existing Vegetation

Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits. Whenever practical, existing vegetation should be preserved. Plants and trees act as effective soil stabilization and sediment control devices, particularly around the perimeter of construction sites. Areas that will not be disturbed as part of construction activities should be clearly marked on plans and protected in the field with fencing prior to clearing and grubbing. Access limitations should also be shown on the plans and described in the Special Contract Requirements (SCR). Any damage to preservation areas should be repaired immediately.

Items to consider when preserving existing vegetation include:

- Preserve existing vegetation to provide effective erosion control;
- Consider the age, life expectancy, health, aesthetic value, and habitat benefits of vegetation to be preserved;
- Areas containing vegetation to be preserved must be shown on the plans; and
- Preserve native plants on the site wherever possible.

4.2.1.3 Hydraulic Mulch

Hydraulic mulch consists of applying a water-based mixture of wood or paper fiber and stabilizing emulsion with hydro-mulching equipment. This will protect disturbed soil from erosion by raindrop impact or wind.

4.2.1.3.1 Type: Wood Fiber

Wood fiber mulch is generally used as a component of hydraulic applications. It is usually used in combination with seed, fertilizer and other materials, and is typically applied at the rate of 2,250 to 4,500 kilograms per hectare (kg/ha).

Wood fiber mulch can be specified with or without a tackifier. Data shows that wood fiber mulches with tackifiers have better erosion control performance.

4.2.1.3.2 Type: Recycled Paper

Recycled paper mulch is generally used in hydraulic applications. It is usually used in combination with seed and fertilizer and is typically applied at the rate of 2,250 to 4,500 kg/ha.

4.2.1.3.3 Type: Cellulose Fiber

Cellulose fiber mulch contains fibers of shorter length than wood fiber mulches and is typically made from recycled newsprint, magazine, or other waste paper sources. It can be specified with or without a tackifier.

4.2.1.3.4 Type: Bonded Fiber Matrix

A bonded fiber matrix (BFM) is a hydraulically applied system of fibers and adhesives that upon drying forms an erosion-resistant blanket that promotes vegetation, and prevents soil erosion. BFMs are typically applied at rates from 3,400 to 4,500 kg/ha based on the manufacturer's recommendation.

The biodegradable BFM is composed of materials that are 100% biodegradable. The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re-wetting. Typically, biodegradable BFMs should not be applied immediately before, during or immediately after rainfall so that the matrix will have an opportunity to dry for 24 hours after application.

4.2.1.4 Hydro seeding

Hydro seeding consists of applying a water-based mixture of wood or paper fiber, stabilizing emulsion, and seed with hydro-mulching equipment. This is usually a multi-step process with a layer of straw. Often fertilizer and compost are added to the hydraulic mixture. This will protect disturbed soil from erosion by raindrop impact or wind. Hydraulic mulches are typically combined with a seed mixture for achieving longer term temporary soil stabilization than by hydraulic mulching alone. The selection of plant materials to be included in the seed mixture can be based, in part, on the length of time temporary stabilization is required.

4.2.1.5 Soil Binders

Soil binders, also known as soil stabilizers, are adhesives that stabilize soil by binding soil particles together. This will protect disturbed soil from erosion by raindrop impact or wind. Soil binders can also be used in combination with hydraulic mulches to improve their erosion control effectiveness.

There are five types of soil binders:

- Plant Material-Based (Short-Term);

- Plant Material-Based (Long-Term);
- Polymeric Emulsion Blends;
- Petroleum or Resin-Based Emulsions; and
- Cementitious-Based Binders.

4.2.1.5.1 Type: Plant-Material Based (Short-Term)

4.2.1.5.1.1 Guar

Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be applied at the rate of 1.2 to 1.8 kg per 1,000 liters of water, depending on application machine capacity. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (V:H):	Flat	1:4	1:3	1:2	1:1
Kg/ha:	45	50	56	67	78

4.2.1.5.1.2 Psyllium

Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but re-wettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates are generally 90 to 225 kg/ha, with enough water in solution to allow for a uniform slurry flow.

4.2.1.5.1.3 Starch

Starch is non-ionic, cold-water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 170 kg/ha. Approximate drying time is 9 to 12 hours.

4.2.1.5.2 Type: Plant-Material Based (Long-Term)

4.2.1.5.2.1 Pitch and Rosin Emulsion

Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water-dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted as follows:

- For clayey soil: 5 parts water to 1 part emulsion
- For sandy soil:10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion/product mixture applied at the rate specified by the manufacturer.

4.2.1.5.3 Type: Polymeric Emulsion Blends

4.2.1.5.3.1 Acrylic Copolymers and Polymers

Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should have a minimum shelf life of one year. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound should air cure within a maximum of 36 to 48 hours. Liquid copolymer should be diluted at a rate of 10 parts water to 1 part polymer and applied to soil at a rate of 11,000 liters/hectare.

4.2.1.5.3.2 Liquid Polymers of Methacrylates and Acrylates

This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water and applied with a hydraulic seeder at the rate of 190 liters per hectare. Drying time is 12 to 18 hours after application.

4.2.1.5.3.3 Copolymers of Sodium Acrylates and Acrylamides

These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (V:H)	Kg/ha
Flat to 1:5	3.4 – 5.6
1:5 to 1:3	5.6 – 11.2
1:2 to 1:1	11.2 – 22.4

4.2.1.5.3.4 Poly-Acrylamide and Copolymer of Acrylamide

Linear copolymer poly-acrylamide is packaged as a dry-flowable solid. When used as a stand-alone stabilizer, it is diluted at a rate of 1.2 kg/1,000 liters of water and applied at the rate of 5.6 kg/ha.

4.2.1.5.3.5 Hydro-Colloid Polymers

Hydro-colloid polymers are various combinations of dry-flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 60 to 70 kg/ha. Drying times are 0 to 4 hours.

4.2.1.5.4 Type: Petroleum or Resin-Based Emulsions

4.2.1.5.4.1 Emulsified Petroleum Resin

This material is a concentrated petroleum hydrocarbon emulsion that is mixed with water and applied to the soil surface at a rate of 23,000 liters per hectare. Dilution rates vary with the type of soil and other site conditions, and should be provided by the manufacturer. They typically range from 12:1 to 20:1 parts water to emulsion.

4.2.1.5.5 Type: Cementitious-Based Binders

4.2.1.5.5.1 Gypsum

This is a formulated gypsum-based product that readily mixes with water and mulch

to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86 percent. It is mixed in a hydraulic seeder and applied at rates 4,500 to 13,500 kg/ha. Drying time is 4 to 8 hours.

4.2.1.6 Straw Mulch

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller, or anchoring it with a tackifier. Straw mulch is used for soil stabilization, as a temporary surface cover, on disturbed areas until soils can be prepared for re-vegetation. It is also used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Loose straw is the most common mulch material used in conjunction with direct seeding of soil. Straw mulching is generally the second part of multi-step process where seed and fertilizer are first applied, then straw mulch is applied as the second step. The final step of the process involves holding the loose straw in place by a) using netting, b) applying a liquid tackifier, or c) punching it into the soil by a process known as "crimping" or "incorporating."

4.2.1.6.1 Type: Wheat or Rice Straw

Straw can be hand applied or machine applied. The fiber length of the straw should be typically greater than 150 millimeters (mm) (6 inches [in]).

4.2.1.7 Geotextiles, Mats/Plastic Covers and Erosion Control Blankets

This BMP involves the placement of geotextiles, plastic covers, or erosion control blankets/mats to stabilize DSAs and protect soil from erosion by wind or water. These measures are typically used when DSAs are particularly difficult to stabilize, around Environmentally Sensitive Areas (ESAs), and as a temporary quick stopgap measure.

4.2.1.7.1 Type: Biodegradable Rolled Erosion Control Products

Biodegradable Rolled Erosion Control Products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. For an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that hold the biodegradable mulch fibers together must also be biodegradable.

4.2.1.7.1.1 Jute Mesh

Jute is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.1.2 Curled Wood Fiber

Excelsior (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80% of the fiber 150 mm (6 in) or longer. The excelsior blanket should be of consistent thickness. The wood fiber should be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Excelsior blanket should be furnished in rolled strips, a minimum of 1,220 mm (48 in) wide, and should have an average weight of 0.5 kilograms per square meter (Kg/m2), +/-10 percent, at the time of manufacture. Excelsior blankets should be secured in place with wire staples. Staples should be made of 3.05-mm (0.12 in) steel wire and should be U-shaped with 200-mm (7.9 in) legs and 50-mm (2 in) crown.

4.2.1.7.1.3 Straw

Straw blanket should be machine-produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket.

The straw blanket should be furnished in rolled strips a minimum of 2 meters (m) (6.6 feet [ft]) wide, a minimum of 25 m (82 ft) long and a minimum of 0.27 kg/m2. Straw blankets should be secured in place with wire staples. Staples should be made of 3.05-mm (0.12 in) steel wire and should be U-shaped with 200-mm (7.9 in) legs and 50-mm (2 in) crown.

4.2.1.7.1.4 Wood Fiber

Wood fiber blanket is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance revegetation. The material is furnished in rolled strips, which should be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.1.5 Coconut Fiber

The coconut fiber blanket should be machine-produced mats of 100% coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. The coconut fiber blanket should be furnished in rolled strips with a minimum of 2 m (6.6 ft) wide, a minimum of 25 m (82 ft) long and a minimum of 0.27-kg/m2. Coconut fiber blankets should be secured in place with wire staples. Staples should be made of 3.05-mm (0.12 in) steel wire and should be U-shaped with 200-mm (7.9 in) legs and 50-mm (2 in) crown.

4.2.1.7.1.6 Coconut Fiber Mesh

Coconut fiber mesh is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which should be secured to the soil with U- shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.1.7 Straw Coconut Fiber

The straw coconut fiber blanket should be machine-produced mats of 70% straw and 30% coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. The straw coconut fiber blanket should be furnished in rolled strips a minimum of 2 m (6.6 in) wide, a minimum of 25 m (82 ft) long and a minimum of 0.27 kg/m2. Straw coconut fiber blankets should be secured in place with wire staples. Staples should be made of 3.05-mm (0.12 in) steel wire and should be U-shaped with 200-mm (7.9 in) legs and 50-mm (2 in) crown.

4.2.1.7.2 Type: Non-Biodegradable Rolled Erosion Control Products

Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.

4.2.1.7.2.1 Plastic Netting

Plastic netting is a lightweight biaxially-oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.2.2 Plastic Mesh

Plastic mesh is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 0.5 centimeters (cm) (0.2 in). It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.2.3 Synthetic Fiber with Netting

Synthetic fiber with netting is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.2.4 Bonded Synthetic Fibers

This type of product consists of a three-dimensional, geomatrix nylon (or other synthetic) matting. Typically it has more than 90% open area, which facilitates root growth. It's tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.2.5 Combination Synthetic and Biodegradable

Combination synthetic and biodegradable RECPs consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high-strength continuous-filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

4.2.1.7.2.6 Rolled Plastic Sheeting

Plastic sheeting should have a minimum thickness of 6 mm (0.24 in), and should be firmly held in place with sandbags or other weights placed no more than 3 m (9.8 ft) apart. Seams are typically taped or weighted down their entire length, and there should be at least a 300 mm (12 in) to 600 mm (24 in) overlap of all seams. Edges should be embedded a minimum of 150 mm (6 in) in native soil.

All sheeting should be inspected periodically after installation and after significant rainstorms to check for erosion and undermining. Any failures shall be repaired immediately. If washout or breakages occurs, the material should be re-installed after repairing the damage to the slope.

4.2.1.7.2.7 Geotextile (Woven)

Woven geotextile material should be a woven polypropylene fabric with a minimum thickness of 15 mm (0.6 in), a minimum of 3.7 m (12ft) wide and should have a minimum tensile strength of 0.67 KN (warp) 0.36 KN (fill) in conformance with the requirements in American Society of Testing and Materials (ASTM) Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec –1 in conformance with the requirements in ASTM Designation: D 4491. The fabric should have an ultraviolet (UV) stability of 70% in conformance with the requirements in ASTM designation: D 4355. Geotextile blankets should be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface waters under geotextile. Staples should be made of 3.05-mm (0.12 in) steel wire and shall be U-shaped with 200-mm (7.9 in) legs and 50-mm (2 in) crown.

4.2.1.7.2.8 Geotextile (Non-Woven)

Non-woven geotextile shall be manufactured from polyester, nylon, or polypropylene material, or any combination thereof. The fabric shall be permeable, non-woven, shall not act as a wicking agent. The fabric shall weigh a minimum of 135 grams per square meter (per ASTM Designation: D 3776), have a minimum grab tensile strength of 0.22 KN in each direction (per ASTM Designation: D 4632), have a minimum elongation at break of 10% (per ASTM Designation: D 4632), have a minimum toughness of 13 KN (percent elongation x grab tensile strength), and a minimum permittivity of 0.5 sec-1 (per ASTM Designation: D 4491).

4.2.1.8 Wood Mulching

Wood mulching consists of applying shredded wood, bark, or green material. The primary function of wood mulching is to reduce erosion by protecting bare soil from raindrop impact and reducing runoff. Use is limited to slopes that are less than 1:3 and depth of the mulch blanket is typically 8 to 10 cm (3 – 4 inches). The material is typically spread by hand, although pneumatic methods are available. Wood mulching is primarily applicable for landscape projects.

4.2.1.9 Earth Dikes/Drainage Swales and Ditches

The primary function of earth dikes, drainage swales and ditches is to prevent erosion and reduce pollutant loading. They are structures that intercept, divert, and convey surface runoff in a controlled, non-erosive manner. Top, toe, and mid-slope diversion ditches, berms, dikes, and swales should be used to intercept runoff and direct it away from critical slopes without allowing it to reach the roadway.

Typically, mid-slope diversion ditches should have a cross-slope of at least 2%, and should be concrete or rock-lined. Top of slope diversions should be paved along cut slopes where the slope length above the cut is greater than 12.2 m (40 ft). Earthen diversion ditches, berms, dikes, and swales channelize flow and should be stabilized with vegetation or other materials to prevent erosion.

Alternatively, drop structures can be placed along the diversion to maintain a grade sufficiently mild to prevent erosive velocities, or a paved chute can be placed down the side of the fill before the accumulated runoff in the diversion is sufficient to cause erosive velocities.

Design guidelines include:

- Select design flow and safety factor based on careful evaluation of the risk due to erosion of the measure, over topping, flow backups, or wash out;

- Examine the site for run-on from off-site sources. These off-site flows should be diverted from the right-of-way;
- Select flow velocity limit of unlined conveyance systems based on soil types and drainage flow patterns for each project site. Establish a maximum flow velocity for using earth dikes and swales, above which a lined ditch must be used. Consider use of rip-rap, engineering fabric, vegetation or concrete lining;
- Consider outlet protection where localized scour is anticipated;
- Consider order of work provisions early in the construction process to effectively install and use the permanent ditches, berms, dikes, and swales; and
- A sediment-trapping device should be used in conjunction with conveyances where sediment-laden water is expected.

4.2.1.10 Outlet Protection/Velocity Dissipation Devices

Outlet protection/velocity dissipation devices are rock, riprap, or other materials placed at pipe outlets to reduce flow velocity and the energy of exiting storm water flows and to prevent scour. They are used where localized scouring is anticipated, such as outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels. They are also used where lined channels or ditches discharge to unlined conveyances.

Appropriate applications include:

- Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels;
- Outlets located at the bottom of mild to steep slopes;
- Discharge outlets that carry continuous flows of water;
- Outlets subject to short, intense flows of water, such as from flash floods; and
- Where lined conveyances discharge to unlined conveyances.

4.2.1.11 Slope Drains

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with lined ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Slope drains should be sized to convey large, infrequent storms down or around the slope. Design the top and toe of slope diversion ditches/berms/dikes/swales to direct flow into the drain. Provide for outlet protection/velocity dissipation devices at the outlet of the drain, as needed

4.2.2 Sediment Control Practices

Sediment control is required along the site perimeter at all operational internal inlets and at all times during the rainy season.

Sediment control devices function by:

- Slowing water velocities, thereby allowing soil particles to settle out; and

- Attenuating the flood peak by detaining flow and releasing water at a slower rate.

All sediment control devices require continued maintenance to function properly. Excess sediment not removed reduces capacity and efficiency.

Examples of sediment control practices include:

- Silt Fence
- Desilting Basin
- Sediment Trap / Filter Bags
- Check Dam
- Fiber Rolls
- Gravel Bag Berm
- Street Sweeping and Vacuuming
- Sand Bag Barrier
- Straw Bale Barrier
- Storm Drain Inlet Protection

4.2.2.1 Silt Fence

A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Silt fences are placed below the toe of exposed and erodible slopes, downslope of exposed soil areas, around temporary stockpiles and along streams and channels. Silt fences should not be used to divert flow or in streams, channels or anywhere flow is concentrated.

4.2.2.2 De-silting Basin

A de-silting basin is a temporary basin formed by excavation and/or constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.

De-silting basins shall be considered for use:

- On construction projects with disturbed areas during the rainy season;
- Where sediment-laden water may enter the drainage system or water courses; and
- At outlets of disturbed soil areas between 2 ha and 4 ha (5 acres and 10 acres).

4.2.2.3 Sediment Trap / Filter Bags

A sediment trap is a temporary basin with a controlled release structure, formed by excavating or constructing an earthen embankment across a waterway or low drainage area. As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Sediment traps may be used on construction projects during the rainy season when the contributing drainage area is less than 2 ha (5 acres). Traps would be placed where sediment laden storm water may enter a storm drain or watercourse, and around and/or up-slope from storm drain inlet protection measures.

Filter bags may be used in place of sediment traps. Sediment filter bags consist of a non-woven geotextile fabric that can catch and contain sediment during dewatering and pumping operations.

4.2.2.4 Check Dam

A check dam is a small device constructed of rock, sand bags, or fiber rolls, placed across a natural or man-made channel or drainage ditch. Check dams reduce scour and channel erosion by reducing flow velocity and encouraging sediment dropout.

Check dams may be installed:

- In small open channels that drain 4 ha (10 acres) or less;
- In steep channels where storm water runoff velocities exceed 1.5 meters per second (m/s) (5 feet per second [ft/s]);
- During the establishment of grass linings in drainage ditches or channels; and
- In temporary ditches where a short length of services does not warrant establishment of erosion-resistant linings.

4.2.2.5 Fiber Rolls

A fiber roll consists of straw, flax or other similar materials inserted into a tube of netting. Fiber rolls are placed on the face of slopes at regular intervals and/or at the toe of slopes to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide some removal of sediment from the runoff. Fiber rolls may be used along the top, face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

4.2.2.6 Gravel Bag Berm

A gravel bag berm consists of a single row of gravel bags that are installed end-to-end to form a barrier across a slope to intercept runoff, reduce runoff velocity, release runoff as sheet flow and provide some sediment removal. The gravel bag berm should be installed along a level contour with the bags tightly abutted.

4.2.2.7 Street Sweeping and Vacuuming

Street sweeping and vacuuming are practices to remove tracked soil particles from paved roads to prevent the sediment from entering a storm drain or watercourse. Street sweeping and vacuuming are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at points of egress.

4.2.2.8 Sand Bag Barrier

A sand bag barrier is a temporary linear sediment barrier consisting of stacked sand bags, designed to intercept and slow the flow of sediment-laden sheet flow runoff. Sand bag barriers allow sediment to settle from runoff before water leaves the construction site.

Sand bags can also be used:

- Where flows are moderately concentrated to divert and/or detain flows;
- Along the perimeter of a site;
- Along streams and channels;
- Below the toe of exposed and erodible slopes; and
- Around stockpiles.

4.2.2.9 Straw Bale Barrier

A straw bale barrier is a temporary linear sediment barrier consisting of straw bales, designed to intercept and slow sediment-laden sheet flow runoff. Straw bale barriers allow sediment to settle from runoff before water leaves the construction site.

Typical applications for straw bale barriers include:

- Along the perimeter of a site;
- Along streams and channels;
- Below the toe of exposed and erodible slopes;
- Downslope of exposed soil areas; and
- Around stockpiles.

4.2.2.10 Storm Drain Inlet Protection

Storm drain inlet protection is a practice to reduce sediment from storm water runoff discharging from the construction site prior to entering the storm drainage system. Effective storm drain inlet protection allows sediment to settle out of water or filters sediment from the water before it enters the drain inlet. Storm drain inlet protection is the last line of sediment control defense prior to storm water leaving the construction site.

Storm drain inlet protection is used:

- Where ponding will not encroach into highway traffic;
- Where sediment-laden surface runoff may enter an inlet;
- Where disturbed drainage areas have not yet been permanently stabilized; and
- Where the drainage area is 0.4 ha (1 acre) or less.

4.2.3 Tracking Control Practices

Tracking control practices prevent or reduce off-site tracking of sediment by vehicles. Tracking is a common source of complaints, and can result the discharge of sediment to storm drains or watercourses. These measures include:

- Stabilized Construction Entrance;
- Stabilized Construction Roadway; and
- Entrance/Outlet Tire Wash.

Tracking controls shall be implemented, as needed, to reduce the tracking of sediment and debris from the construction site. At a minimum, entrances and exits shall be inspected daily, and controls implemented as needed.

4.2.3.1 Stabilized Construction Entrance

A stabilized construction entrance is a designated point of access (ingress and egress) to a construction site that is stabilized to reduce tracking of sediment (mud and dirt) onto public roads by construction vehicles. Stabilized construction entrances are an effective method to limit the migration of sediment from the construction site, especially when combined with street sweeping and vacuuming. The stabilized entrance is typically composed of a crushed aggregate layer over a geotextile fabric or constructed of steel plates with ribs.

4.2.3.2 Stabilized Construction Roadway

A stabilized construction roadway is a temporary access road connecting existing public roads to a remote construction area. It is designed for the control of a dust and erosion created by vehicular traffic. A stabilized construction roadway may be constructed of aggregate, asphalt concrete, or concrete based on the desired longevity.

4.2.3.3 Entrance/Outlet Tire Wash

A tire wash is an area located at stabilized construction access points to remove sediment from tires and undercarriages, and to prevent tracking of sediment onto public roads. The tire wash typically includes a wash rack on a pad of coarse aggregate. The runoff water from the wash area must be conveyed to a sediment trap or basin.

4.2.4 Wind Erosion Control

Wind erosion controls shall be considered for all disturbed soil areas on the project site that are subject to wind erosion and when significant wind and dry conditions are anticipated during construction of the project. Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate wind-blown dust. Dust control must be applied in accordance with FHWA/HDOT standard practices. Water or dust palliatives should be applied so no runoff occurs.

The Hawaii General Construction Permit (Appendix D) requires that special attention be paid to stockpiles. Stockpiles may be covered with plastic, mats, blankets, mulches, or sprayed with water or soil binders. It may also be prudent to surround the base of a stockpile with a row of fiber rolls, silt fence, or other sediment barrier.

Another means to reduce the potential for wind erosion of stockpiles is to keep the height of stockpiles low, and to adjust the shape and orientation of the stockpiles to reduce the area of exposure to the prevailing wind.

4.2.5 Non-Storm Water Controls

The objective of the construction site management (non-stormwater and waste management and materials pollution controls) is to reduce the discharge of materials other than stormwater to the stormwater drainage system or to receiving waters. These controls shall be implemented year-round for all applicable activities, material usage, and site conditions.

The National Pollutant Discharge Elimination System (NPDES) storm water regulations for construction sites also require that BMPs be included in the project plans for control of non-storm water discharges. Non-storm water management measures are source controls that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with storm water. These BMPs are also known as "good housekeeping practices." These BMPs must be in place throughout the grading and construction phases. The measures include:

- Water Conservation Practices
- Illicit Connection/Illegal Discharge Detection and Reporting
- Dewatering Operations
- Potable Water/Irrigation

- Paving and Grinding Operations
- Temporary Stream Crossing
- Clear Water Diversion
- Vehicle and Equipment Cleaning
- Vehicle and Equipment Fueling
- Vehicle and Equipment Maintenance

During preparation of the project plans, it is not always possible to know where a contractor will be performing certain activities. To provide the contractor with flexibility, but to assure that proper control measures are implemented, it is appropriate to identify in the project plans that specific BMPs will be implemented for certain activities regardless of where on the site those activities are performed.

4.2.5.1 Water Conservation Practices

Water conservation practices are activities that use water during the construction of a project in a manner that avoids erosion caused by runoff and the transport of pollutants off the site. If less water is used, the potential for erosion decreases and the transport of construction-related pollutants off site is less likely. Water conservation practices must be implemented on all construction sites wherever water is used. It includes preventing water leaks, avoid vehicle washing on site, sweeping in lieu of hosing areas, and applying water for dust control to minimize runoff.

4.2.5.2 Dewatering Operations

This BMP is intended to prevent the discharge of pollutants from construction site dewatering operations associated with storm water (accumulated rain) and non-storm water (groundwater, water from a diversion or cofferdam, etc.). Dewatering effluent that is discharged from the construction site to a storm drain or receiving water is subject to the requirements of the applicable NPDES permit.

4.2.5.3 Paving and Grinding Operations

Procedures that minimize pollution of storm water runoff during paving operations include new paving and preparation of existing paved surfaces for overlays. Paving and grinding operations include handling materials, wastes and equipment associated with pavement removal, paving, surfacing, resurfacing, pavement preparation, thermoplastic striping and placing pavement markers.

4.2.5.4 Temporary Stream Crossing (Discussed further in Chapter 5)

A temporary stream crossing is a structure placed across a waterway that allows vehicles to cross the waterway during construction without contacting the water, thus reducing erosion and the transport of pollutants into the waterway. Temporary stream crossings are typically conditions of regulatory permits for work near live streams. Installation may require dewatering or temporary diversion of the stream. Types of temporary stream crossings include culverts, fords, and bridges. Their design requires knowledge of stream flows, soils, and wildlife.

4.2.5.5 Clear Water Diversion (Discussed further in Chapter 5)

Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a construction site, transport it around the site, and discharge it downstream with minimal water quality impact. A common example is a temporary creek diversion system that consists of a sandbag cofferdam and a flexible plastic pipe to divert the water around the construction site. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, drainage, and interceptor swales.

4.2.5.6 Illicit Connection/Illegal Discharge Detection and Reporting

These procedures and practices are designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents to the Project Engineer (PE).

4.2.5.7 Potable Water/Irrigation

Potable water/irrigation consists of practices and procedures to reduce the discharge of potential pollutants generated from irrigation water lines, landscape irrigation, lawn or garden watering, potable water sources, water line flushing, and hydrant flushing. These practices include reusing discharges for landscaping, automatic shut-off valves, prevention of impacts to downstream drainage systems, leak detection, inspection of equipment and lines, and repair of broken pipes.

4.2.5.8 Vehicle and Equipment Cleaning

This BMP consists of procedures and practices used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drains or watercourses. On most construction sites, vehicle and equipment cleaning on site should be discouraged.

If vehicle or equipment cleaning is allowed, then soap, solvents, or steam shall not be used unless approved by the PE. Vehicle and equipment wash water must be contained for percolation or evaporation, and must not be discharged off site.

4.2.5.9 Vehicle and Equipment Fueling

This BMP consists of measures and practices to minimize or eliminate the discharge of fuel spills and leaks into the storm drain system or to watercourses. These measures include containment of fueling areas, spill prevention and control, drip pans or absorbent pads, automatic shut-off nozzles, vapor recovery nozzles, topping off restrictions, and leak inspection and repair.

4.2.5.10 Vehicle and Equipment Maintenance

This BMP consists of procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain system or to watercourses from vehicle and equipment maintenance procedures. Practices include drip pans or absorbent pads, spill kits, dedicated maintenance areas, proper waste disposal, leak repair, and secondary containment.

4.2.5.11 Pile Driving Operations

The construction of bridges and retaining walls often includes driving piles for foundation support. Piles are typically constructed of cast in place concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce the discharge of potential pollutants to the storm drain system or watercourses. These procedures apply to all construction sites where permanent and temporary pile driving operations take place.

4.2.5.12 Concrete Curing

This BMP consists of procedures that minimize pollution of storm water runoff during concrete curing. Concrete curing includes the use of both chemical and water methods. Concrete curing is used for the construction of structures such as bridges, retaining walls, and pump houses. Any element of the structure (i.e., footings, columns, abutments, stem and soffit, decks) may be subject to curing requirements.

4.2.5.13 Material and Equipment Use Over Water (Discussed Further in Chapter 5)

This BMP consists of procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants to a watercourse. These procedures shall be implemented for construction materials and wastes (solid and liquid), soil or dredging materials, or any other materials that may be detrimental if released and apply where equipment is used over or adjacent to a watercourse.

4.2.5.14 Concrete Finishing

This BMP consists of procedures to minimize the impact that concrete finishing methods may have on storm water runoff. Methods include sand blasting, lead shot blasting, grinding, or high pressure water blasting. Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances.

4.2.5.15 Structure Demolition/Removal Over Water (Discussed Further in Section ////)

This BMP consists of procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses. These procedures shall be implemented for full bridge demolition and removal, partial bridge removal (i.e., barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

4.2.6 Waste Management and Materials Pollution Control

The NPDES storm water regulations for construction sites also require that BMPs be included in the project plans for waste management and materials pollution control. These are source control BMPs that prevent pollution by reducing pollutants at their source, and require a clean, well-kept site. The measures include:

- Material Delivery and Storage
- Material Use
- Stockpile Management
- Spill Prevention and Control
- Solid Waste Management
- Hazardous Waste Management
- Contaminated Soil Management
- Concrete Waster Management
- Sanitary/Septic Waste Management
- Liquid Waste Management

As with the non-storm water management measures, it is important to provide the contractor with flexibility, but to identify that in the plans, that specific BMPs will be implemented for certain activities regardless of where on the site those activities are performed.

4.2.6.1 Material Delivery and Storage

This BMP consists of procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses. These procedures include secondary containment, spill prevention and control, product labeling, quantity reduction, proper storage, material covering, training, and inventory control.

4.2.6.2 Material Use

This BMP consists of procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or watercourses. These procedures include proper waste disposal, product labeling, proper cleaning techniques, recycling materials, reducing quantities, and application rates, spill prevention and control, training, and reduction of exposure to storm water.

4.2.6.3 Stockpile Management

This BMP consists of procedures and practices to eliminate pollution of storm water from stockpiles of soil and paving materials (such as concrete rubble, aggregate, and asphalt concrete). These procedures include locating stockpiles away from drainages, providing perimeter sediment barriers, and wind erosion control measures.

4.2.6.4 Spill Prevention and Control

This BMP consists of procedures and practices implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to storm drain systems or watercourses. Spill prevention and prompt appropriate spill response reduce the potential for polluting receiving waters with spilled contaminants. Spills of concern include chemicals and hazardous wastes such as soil stabilizers/binders, dust palliatives, herbicides, growth inhibitors, fertilizers, de-icing products, fuels, lubricants, paints, and solvents. Spill prevention practices include education as well as cleanup and storage procedures that address small spills, semi- significant spills, and significant/hazardous spills. A Spill Prevention Control and Countermeasure (SPCC) Plan may be required to document the anticipated procedures and protocols to be implemented on the project.

4.2.6.5 Solid Waste Management

This BMP consists of procedures and practices to minimize or eliminate the discharge of pollutants to storm drain systems or watercourses as a result of the creation, stockpiling or removal of construction site wastes. Solid wastes include such items as used brick, mortar, timber, steel, vegetation/landscaping waste, empty material containers, and litter. Measures include education as well as collection, storage, and disposal practices.

4.2.6.6 Hazardous Waste Management

This BMP consists of procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain system or watercourses. Hazardous wastes should be collected, stored, and disposed of using practices that prevent contact with storm water. The following types of wastes are considered hazardous; petroleum products, concrete curing compounds, palliatives, septic wastes, paints, stains, wood preservatives, asphalt products, pesticides, acids, solvents, and roofing tar. There may be additional wastes on the project that are considered hazardous. It is also possible that non-hazardous waste could come into contact with these hazardous wastes, such that they become contaminated and are therefore considered hazardous waste. Measures include education, storage procedures, and disposal procedures.

4.2.6.7 Contaminated Soil Management

This BMP consists of procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain system or watercourses from contaminated soil. Typical soil contamination is due to spills, illicit discharges, and underground storage tank leaks, or aerially deposited lead (ADL). Contaminated soils tend to occur on projects in urban or industrial areas. Soil contaminants and locations are often identified in the project plans and specifications. Measures include identifying contaminated areas, education, handling procedures for material with ADL, handling procedures for contaminated soils, procedures for underground storage tank removals, and water control.

4.2.6.8 Concrete Waste Management

This BMP consists of procedures and practices that are implemented to minimize or eliminate the discharge of concrete waste materials to the storm drain system or to watercourses. These measures include education, concrete slurry waste handling procedures, on-site concrete washout facility, transit truck washout procedures, and procedures for removal of temporary concrete washout facilities.

4.2.6.9 Sanitary/Septic Waste Management

This BMP consists of procedures and practices to minimize or eliminate the discharge of construction site toilet facilities to the storm drain system or watercourse. Measures include education, and storage and disposal procedures.

4.2.6.10 Liquid Waste Management

This BMP includes procedures to prevent pollutants related to non-hazardous liquid wastes from entering storm drains or receiving waters. Liquid wastes include drilling slurries, drilling fluids, wastewater that is free from grease and oil, dredging's, and other non-storm water liquid discharges not covered by separate permits. This BMP does not apply to the following:

- Dewatering operations;
- Solid wastes;
- Hazardous wastes ;
- Concrete slurries;
- Liquid wastes covered by specific laws or permits; and
- Non-storm water discharges permitted by any FHWA/HDOT NPDES permit unless FHWA/HDOT determines that the discharge contains pollutants.

4.3 Monitoring and Inspection Program

The Project Engineer (PE) or Resident Engineer (RE) is responsible for ensuring that construction personnel monitor the contractor's water pollution control practices and maintain compliance with the approved project SWPPP. This includes reviewing the contractor's SWPPP, reviewing written inspection reports, and conducting field inspections. All construction personnel should also be aware of the water pollution control requirements and participate in the monitoring program. Key steps to a successful monitoring and inspection program are summarized below.

Step 1. Do your Homework

a. Review the Current FHWA and HDOT Storm Water Quality Handbooks included in Appendix A, B and E of this manual.

Construction personnel with storm water responsibilities should familiarize themselves with BMP requirements. In particular, become familiar with (1) the rainy season dates for your geographical area, (2) the definitions of DSA, active DSA, and non-active DSA, and (3) the requirements for soil stabilization and sediment control BMPs for the season and specific Rainfall Area.

b. Review the Project Plans.

Review the Project Plans in the context of storm water pollution control. Visualize storm water run-on and runoff flow patterns when reviewing the plans. Review the general layout and existing drainage courses. Identify potential problem areas where storm water may run onto the site or discharge off site.

Identify the locations where structures are being constructed or modified. Be familiar with the right-of-way and easement limits. Determine the limits of clearing and grubbing activities (i.e. Construction Limits). Identify the project phase or stage. Try to determine DSAs and Environmentally Sensitive Areas (ESAs). Is the next phase going to include soil-disturbing activities and is it scheduled within the rainy season? Do the DSAs have provisions in the plans for permanent erosion control? Determine if permanent erosion control can be placed when activity in the DSA is complete.

c. Review the SCRs

Review the SCRs for site-specific water pollution control requirements such as:

(1) permits for the construction project, (2) limits on active DSAs, (3) rainy season dates and requirements, (4) minimum BMP requirements, (5) BMP maintenance and inspection requirements, and (6) final erosion control requirements. Final erosion control requirements include (1) required products, (2) application process, (3) application rate, (4) seeding window, and (5) planting requirements.

The SCRs also include a section on water pollution control permits or requirements imposed on the project by other agencies. Typical agencies include the USACE, DOH-CWB, USFWS, NMFS, local flood control agencies, and others. There may be special requirements for water bodies or ESAs that need special water pollution control consideration.

Review the SCRs bid items related to water pollution control. There may be lump sums or unit prices for water pollution control items including SWPPP/WPCP preparation, permanent erosion control, and temporary erosion and sediment controls.

Review the section of the SCRs for site-specific activities such as: (1) dewatering, (2) sampling and analysis, (3) BMP maintenance cost allocation between FHWA/HDOT and the contractor, and (4) sanctions against the contractor in the event of non- compliance with the water pollution control requirements.

d. Review the SWPPP/IWPPP.

The SWPPP or IWPPP for the project is the contractor's plan to ensure conformance with FHWA/HDOT water pollution control requirements on the construction site. The SWPPP/IWPPP contains conceptual details about the BMPs to be used on the site, their locations, implementation timeframes, and inspection and maintenance schedules. The contractor must comply with the approved SWPPP/WPCP. If conditions change on the construction site that impact storm water pollution controls, the contractor must amend the SWPPP/IWPPP.

The SWPPP/IWPPP contains the approval signature, lists any amendments, describes unique features of the construction site, and contains the construction and water pollution control schedules. It also identifies the BMPs selected for soil stabilization, sediment control, non-storm water controls, waste management, and materials disposal controls and references locations on the vicinity map and water pollution control drawings.

e. Review the Schedule.

The accepted Baseline schedule as well as the monthly updates and three-week "look-ahead" schedules are important references to better anticipate which BMPs will be implemented or needed. A project schedule is required in both SWPPPs and must show how the rainy season relates to soil-disturbing and re-stabilization activities and must also show major activities sequenced with implementation of BMPs.

Step 2. Establish an Inspection Schedule

a. Prior to the rainy season, inspect the site to ensure that the contractor has the necessary materials to stabilize required DSAs and to implement the necessary sediment controls.

b. Year round, inspect the construction site prior to a forecast storm, after a rain event that causes runoff from the construction site, and at 24-hour intervals during an extended rain event. Refer to Section 4.4, Rain Event Action Plan.

c. Conduct inspections at other frequencies as required by the Special Provisions.

d. Work with the PE, and Inspectors during site inspections and to receive assistance when necessary.

Step 3. Conduct the Inspection

a. Document the Inspection in a Construction Site Inspection Checklist.

b. Encourage the contractor to participate in the inspection. This provides the opportunity for verbal feedback and discussion.

c. If the project involves significant structures work, encourage the Structures representative or inspector to participate in the inspection. Take a copy of the most current and approved site plan(s) and SWPPP on the inspection for identification of site features and for taking notes at specific areas.

d. Fill out the Inspection Checklist and add findings in writing. Use clear and concise language and give specific locations where problems were observed.

e. Take photographs during the inspection to document the existing conditions. This is especially important if the contractor does not attend the inspection. When photos of problem areas are taken, try to follow up with photos showing corrections.

f. Inspect the entire site, including the perimeter, especially where there is potential for run-on or discharge from the site. Look for areas of potential concentrated flows and for adjacent water bodies or drainage facilities that may be affected by discharges from the site. Start the inspection at the lowest point, or the area with the highest potential for discharge. Inspect all potential discharge points. The SWPPP should identify discharge points; however, there may be areas with discharge potential that were not identified in the SWPPP.

g. Inspect the contractor's yard(s), where required.

h. Look for changes in construction or site conditions that may require an amendment to the SWPPP.

i. Inspect for proper implementation of non-storm water management BMPs and waste management and materials pollution control BMPs.

j. For inspections during the rainy season, evaluate active and non-active DSAs. (The PE or RE should periodically evaluate the classification of construction areas as active DSAs or non-active DSAs.) Determine the total area of DSA and compare it to the limit for DSAs in the Special Provisions. If the existing DSA exceeds the limit, identify areas that can be stabilized to reduce the amount. Active DSAs require protection prior to the onset of rain. Evaluate erosion and sediment control BMPs based on the requirements related to Rainfall Area, season and active/non-active status as defined in the SWPPP and BMP Manual. Be sure to inspect the entire site during a rain event, especially when run-off from the site occurs.

k. During the non-rainy season, identify the active and non-active DSAs. Depending on the Rainfall Area, DSAs may continue to require erosion and sediment control BMPs during the non- rainy season.

l. For individual BMPs, note if the BMP is properly installed. Also note if the BMP is in need of repair or maintenance.

Step 4. Report the Inspection Results

a. If the PE or RE did not attend the inspection, communicate the results to the Resident Engineer.

b. Ideally, observations should be discussed with the contractor during the inspection.

c. Missing BMPs and non-compliance issues must be communicated to the contractor. Refer to the contractor's SWPPP/IWPPP for required BMPs.

Step 5. Follow-up with Corrective Measures

The contractor must install missing BMPs and correct improperly installed or damaged BMPs immediately or by a date and time as approved in writing by the Project Engineer or Resident Engineer. In any event, corrections must be made prior to the next rain event.

Corrective actions will be implemented within 72 hours for deficiencies identified during inspections. SWPPP amendments will be prepared by a qualified SWPPP practitioner if warranted by the problem encountered and corrective action required.

At a minimum, erosion and sediment controls will be cleaned, repaired, or replaced under these conditions:

- In advance of the rainy season and prior to a storm event
- When sediment or other debris has accumulated to greater than one-third the height of the barrier
- When sediment accumulation reaches one-third of the trap capacity
- When more than one-third of the cross section of a conveyance structure, such as a drainage swale or ditch, is plugged or blocked

Table 7 provides a BMP implementation and maintenance schedule. The selection of BMPs can potentially change during Project construction, and Table 7 will be amended accordingly.

Table 7 - BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Silt fence	Prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Replace torn sections; repair up-rooted sections; clean out collected sediment when greater than 1/3 height of fence
Fiber rolls; coir logs; compost socks; biofilter bags	Prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Replace crushed sections; replace rotted sections; clean out collected sediment when greater than 1/3 height of roll
Sediment basin; Sediment trap	Prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair damage and remove obstructions as needed; stabilize eroded areas; clean out collected sediment when 1/2 of designated storage volume of basin or 1/3 of trap capacity; dewater within 72 hours

Table 7 - BMP Implementation and Maintenance Schedule			
Best Management Practices	**Implementation**	**Inspection Frequency**	**Maintenance**
Check dams; velocity dissipation devices	Prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Replace degraded or missing rock, bags, etc.; clean out when collected soil greater than 1/3 of barrier height
Dikes and drainage swales; slope drains	Prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during	Repair as needed
Non-stormwater and materials management	Planned prior to construction	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Dispose of waste materials weekly; contract with outside vendors as needed; keep material storage areas clean and orderly; train all employees on correct use of materials and spill response
Erosion control blankets (geotextiles); non-vegetative stabilization; compost blankets	In sequence with construction activities; prior to forecasted rain event	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair eroded areas; replace and repair geotextiles and mats as needed
Sandbags	Prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair, reshape, replace bags as necessary; replace bags exposed to sunlight every 2 to 3 months; clean out collected sediment when greater than 1/3 barrier height

Table 7 - BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Gravel bags	Prior to construction and in sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair, reshape, replace bags as necessary; replace bags exposed to sunlight every 2 to 3 months; clean out collected sediment when greater than 1/3 barrier height
Storm drain inlet protection	Prior to construction	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Clean and repair filters or fabric fence as needed; clean out collected sediment when greater than 1/3 barrier height
Hydraulic mulch	In sequence with construction activities; prior to forecasted rain event	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair eroded areas; reapply on bare areas as needed
Mulch (straw, wood, organic); soil binders	In sequence with construction activities; prior to forecasted rain event	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair eroded areas; reapply on bare areas as needed

Table 7 - BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Hydroseeding; seeding (if applicable)	As soon as possible after disturbance has permanently or temporarily ceased, but in no case more than 14 days after the construction activity in an area has ceased (except when construction activity will resume on that portion of the site within 21 days)	Inspect before and after storm events (and once each 24-hour period during extended storm events), weekly; monitored every May for the first 3 years following Project completion	Reseed areas that do not meet revegetation criteria
Streambank stabilization	In sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair eroded areas; replace BMP measure as needed
Straw bale barrier	In sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Replace rotted sections; clean out collected sediment when greater than 1/3 height of barrier
Active treatment system	In sequence with construction activities	Follow guidelines of the Construction General Permit	Follow guidelines of the Construction General Permit
Concrete washout	In sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Clean out, or construct new facility, once the washout is 75 percent full

Table 7 - BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Aggregate surfacing	Completion of grading activities	Weekly	Keep all temporary roadway ditches clear; periodically apply additional aggregate as needed
Stabilized construction entrance/exit	Prior to grading/earth disturbance	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Remove aggregate, separate and dispose of sediment when construction entrance/exit is clogged with sediment; keep all temporary roadway ditches clear; check for damage and repair as needed; replace gravel material when surface voids are visible
Stabilized construction roadway	Prior to start of associated construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Keep all temporary roadway ditches clear; periodically apply additional aggregate on gravel roads
Stockpile management	In sequence with construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Repair or replace perimeter controls and covers as needed

Table 7 - BMP Implementation and Maintenance Schedule

Best Management Practices	Implementation	Inspection Frequency	Maintenance
Street sweeping and vacuuming	Start of construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); when actively in use, inspect points of ingress and egress daily, otherwise weekly	Remove tracked or spilled sediment outside the construction limits at a minimum daily
Tire wash	Prior to start of associated construction activities	Inspect before and after storm events (and once each 24-hour period during extended storm events); weekly	Remove accumulated sediment in wash rack to maintain system performance; repair as needed

4.4 Rain Event Action Plans

The Rain Event Action Plans (REAP) is written document designed to be used as a planning tool by a qualified stormwater professional (QSP) to protect disturbed portions of the construction site and to ensure that adequate materials and staff are available to implement erosion and sediment control measures. It is the responsibility of the QSP to be aware of precipitation forecast and to obtain and print copies of forecasted precipitation from NOAA's National Weather Service Forecast Office (http://www.prh.noaa.gov/hnl/).

A REAP template for each applicable project phase can be found in Appendix F. The QSP shall customize these templates for each rain event and project phase when the project is under construction. The QSP shall maintain a paper copy of completed REAPs in compliance with the record retention requirements of the SWPPP/ IWPPP. Completed REAPs shall be maintained on the project site with the SWPPP/IWPPP throughout the duration of construction.

The QSP will develop the event-specific REAP 48 hours prior to precipitation event forecast to have a 50% or greater chance of producing precipitation in the project area. The REAP will be maintained onsite and be implemented 24 hours in advance of the predicted precipitation event.

At a minimum, the REAP will include the following site and phase-specific information:

- Site Address;
- Site Stormwater Manager Information including the name, company and 24-hour emergency telephone number;
- Erosion and Sediment Control Provider information including the name, company and 24-hour emergency telephone number;
- Stormwater Sampling/Inspector Agent information including the name, company, and 24-hour emergency telephone number;
- Activities associated with each construction phase;
- Trades active on the construction site during each construction phase;
- Trade Contractor information; and
- Recommended actions for each project phase.

4.4.1 Rain Event Triggered Observations and Inspections

Visual observations of the site and inspections of BMPs are required prior to a qualifying rain event, following a qualifying rain event, and every 24-hour period during a qualifying rain event. Pre-rain inspections will be conducted after consulting NOAA and determining that a precipitation event with a 50% or greater probability of precipitation has been predicted.

4.4.2 Visual Observations Prior to a Forecasted Qualifying Rain Event

The REAP must be available onsite at least 48-hours prior to a qualifying forecast storm event. A stormwater visual monitoring site inspection and observations shall be conducted at the following locations:

- Potential pollutant sources are properly stored (i.e. sorted in covered areas, elevated off ground surfaces, etc.);
- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;
- BMPs to identify if they have been properly implemented or require maintenance;
- Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

4.4.3 BMP Inspections During an Extended Storm Event

During an extended rain event BMP inspections will be conducted every 24 hours during normal business hours to identify and record:

- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;
- Evidence of any spills, leaks, or uncontrolled pollutant sources that may have migrated offsite;
- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;

- BMPs that have failed; or
- BMPs that could fail to operate as intended.

If the construction site is not accessible during the rain event, the visual inspections shall be performed at all relevant outfalls, discharge points, and downstream locations. The inspections should record any projected maintenance activities.

4.4.4 Visual Observations Following a Qualifying Rain Event

Within 48 hours following a qualifying rain event (½ inch of rain) a stormwater visual monitoring site inspection is required to observe:

- Evidence of any spills, leaks, or uncontrolled pollutant sources that may have migrated offsite;
- BMPs to identify if they have been properly designed, implemented, and effective;
- Need for additional BMPs or BMP maintenance;
- Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard; and
- Discharge of stored or contained rain water.

If the QSP or the Project Engineer (PE) identifies a deficiency in the implementation of the accepted SWPPP/IWPPP, the deficiency must be corrected immediately unless the PE authorizes an agreed date for correction. The correction must occur before the onset of precipitation.

If failure to correct the deficiency by the scheduled date or by the onset of precipitation occurs, the project may correct the deficiency and deduct the cost of correcting the deficiency from payment. Failure to comply with the corrective action may result in the suspension of work by the PE until the project complies with the requirements of the SWPPP/IWPPP.

CHAPTER 5:

5 CONSTRUCTION BMPS FOR WORKING IN, OVER OR ADJACENT TO WATERS OF THE U.S.:

5.1 WORKING ON OR OVER WATER; INCLUDING MATERIAL AND EQUIPMENT USE ON WATER:

5.1.1 DESCRIPTION AND PURPOSE

Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants to a watercourse.

5.1.2 APPROPRIATE APPLICATIONS

Applies where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent to a watercourse including waters of the United States. These procedures should be implemented for construction materials and wastes (solid and liquid), soil or dredging materials, or any other materials that may be detrimental if released.

5.1.3 LIMITATIONS

Dredge and fill activities are regulated by the USACE and DOH-CWB under Section 404/401 of the CWA and Section 10 of RHA. Ensure all appropriate permits are obtained prior to construction activities.

5.1.4 STANDARDS AND SPECIFICATIONS

- Refer to BMPs for Material Delivery and Storage and Spill Prevention and Control.
- Use drip pans and absorbent materials for equipment and vehicles and ensure that an adequate supply of spill clean-up materials is available.
- The exterior of vehicles and equipment that will encroach on a water body within the project should be maintained free of grease, oil, fuel, and residues and may require vegetable based hydraulic oil.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle is expected to be idle for more than 1 hour.
- Maintain equipment in accordance with BMPs for Vehicle and Equipment Maintenance. If a leaking line cannot be repaired, remove equipment from over the water
- Provide watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from leaving the barge, platform, dock, etc.
- Secure all material to prevent discharge to receiving waters via wind.

- Identify types of spill control measures to be employed, including the storage of such materials and equipment. Ensure that staff is trained regarding the use of the materials, deployment and access control measures, and reporting measures.
- In case of spills, contact the PE who will contact the USACE and DOH-CWB as soon as possible but within 48 hours.
- Refer to BMPs for Solid Waste Management (non-hazardous) and Hazardous Waste Management. Ensure the timely and proper removal of accumulated wastes.
- Comply with all necessary permits required for construction within or near the watercourse, such as DOH-CWB 401 WQC, USACE 404 permit
- Discharges to waterways should be reported to the USACE and DOH-CWB immediately upon discover. A written discharge notification must follow within 7 days. Follow the spill reporting procedures contained in the SWPPP.

5.1.5 Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Ensure that employees and subcontractors implement the appropriate measures for storage and use of materials and equipment.
- Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the water courses, including waters of the United States.

5.2 Demolition Over or Adjacent to Water

5.2.1 Description and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

5.2.2 Appropriate Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

5.2.3 Limitations

Specific permit requirements may be included in the contract documents.

5.2.4 Standards and Specifications

- Refer to Clear Water Diversion and Isolation Techniques, to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris.
- Platforms and covers are to be approved by the PE.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with Stockpile Management.
- Ensure safe passage of fish and wildlife.
- Discharges to waterways shall be reported to the DOH-CWB immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures in the SWPPP.
- For structures containing hazardous materials, i.e., lead paint or asbestos, refer to Hazardous Waste Management procedures. For demolition work involving soil excavation around lead-painted structures, refer to Contaminated Soil Management procedures.

5.2.5 Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from runon and runoff.

5.3 Temporary Stream/River Crossing

5.3.1 Description and Purpose

A temporary stream crossing is a temporary culvert, ford or bridge placed across a waterway to provide access for construction purposes for a period of less than one year. Temporary access crossings are not intended to maintain traffic for the public. The temporary access will eliminate erosion and downstream sedimentation caused by vehicles.

5.3.2 Appropriate Applications

Temporary stream crossings should be installed at all designated crossings of perennial and intermittent streams on the construction site, as well as for dry channels that may be significantly eroded by construction traffic.

Temporary streams crossings are installed at sites:

- Where appropriate permits have been secured for the temporary crossing (404 Permits, and 401 Certifications)
- Where construction equipment or vehicles need to frequently cross a waterway
- When alternate access routes impose significant constraints
- When crossing perennial streams or waterways causes significant erosion
- Where construction activities will not last longer than one year

5.3.3 Limitations

The following limitations may apply:

- Specific permit requirements or mitigation measures such as 401 Water Quality Certification, U.S. Army Corps of Engineers Section 404 or Section 10 permits, U.S. Coast Guard Section 9 or General Bridge Act Permits and approval by USFWS and NMFS supersede the guidance in this BMP. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Installation and removal will usually disturb the waterway.
- Installation may require dewatering or temporary diversion of the stream. See , Dewatering Operations and Clear Water Diversion BMPs.
- Installation may cause a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.
- Use of natural or other gravel in the stream for construction of Cellular Confinement System (CCS) ford crossing will be contingent upon approval by fisheries agencies.
- Ford crossings may degrade water quality due to contact with vehicles and equipment.
- May be expensive for a temporary improvement.

- Requires other BMPs to minimize soil disturbance during installation and removal.
- Fords should only be used in dry weather.

5.3.4 Standards and Specifications

5.3.4.1 General

The purpose of this BMP is to provide a safe, erosion-free access across a stream for construction equipment. Minimum standards and specifications for the design, construction, maintenance, and removal of the structure should be established by an engineer registered in California. Temporary stream crossings may be necessary to prevent construction equipment from causing erosion of the stream and tracking sediment and other pollutants into the stream.

Temporary stream crossings are used as access points to construction sites when other detour routes may be too long or burdensome for the construction equipment. Often heavy construction equipment must cross streams or creeks, and detour routes may impose too many constraints such as being too narrow or poor soil strength for the equipment loadings. Additionally, the contractor may find a temporary stream crossing more economical for light– duty vehicles to use for frequent crossings, and may have less environmental impact than construction of a temporary access road.

Location of the temporary stream crossing should address:

- Site selection where erosion potential is low.
- Areas where the side slopes from site runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings should be considered:

- **Culverts –** A temporary culvert is effective in controlling erosion but will cause erosion during installation and removal. A temporary culvert can be easily constructed and allows for heavy equipment loads.
- **Fords -** Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams, and low-flow perennial streams. A temporary ford provides little sediment and erosion control and is ineffective in controlling erosion in the stream channel. A temporary ford is the least expensive stream crossing and allows for maximum load limits. It also offers very low maintenance. Fords are more appropriate for ephemeral drainages in drier areas.
- **Bridges -** Appropriate for streams with high flow velocities, steep gradients and where temporary restrictions in the channel are not allowed.

5.3.4.2 Design

For short duration work in ephemeral drainages, a temporary ford may be sufficient. However, a ford is not appropriate if construction will continue through the rainy season, if summer thunderstorms are likely, or if the stream flows during most of the year. Temporary culverts and bridges should then be considered and, if used, should be sized to pass a design storm (i.e., at least a 2 to 5-year storm). The temporary stream crossing should be protected against erosion, both to prevent excessive sedimentation in the stream and to prevent washout of the crossing.

Design and installation requires knowledge of stream flows and soil strength. Designs should be prepared under direction of, and approved by, a registered civil engineer and for bridges, a registered structural engineer. Both hydraulic and construction loading requirements should be considered with the following:

- Comply with any special requirements for culvert and bridge crossings, particularly if the temporary stream crossing will remain through the rainy season.
- Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor should be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.
- Install sediment traps immediately downstream of crossings to capture sediments. See BMP Summary for Sediment Trap.
- Avoid oil or other potentially hazardous materials for surface treatment.
- Culverts are relatively easy to construct and able to support heavy equipment loads.
- Fords are the least expensive of the crossings, with maximum load limits.
- CCS crossing structures consist of clean, washed gravel and CCS blocks. These systems are appropriate for streams that would benefit from an influx of gravel; for example, streams or rivers below reservoirs, and urban, channelized streams. Many urban stream systems are gravel-deprived due to human influences, such as dams, gravel mines, and concrete channels.
- The CCS allows designers to use either angular or naturally occurring rounded gravel, because the cells provide the necessary structure and stability. In fact, natural gravel is optimal for this technique, because of the habitat improvement it will provide after removal of the CCS.
- A gravel depth of 6 to 12 in. for a CCS structure is sufficient to support most construction equipment.
- An advantage of a CCS crossing structure is that relatively little rock or gravel is needed, because the CCS provides the stability.
- Bridges are generally more expensive to design and construct, but provide the least disturbance of the streambed and constriction of the waterway flows.

5.3.4.3 Construction and Use

- Stabilize construction roadways, adjacent work area, and stream bottom against erosion.
- Construct during dry periods to minimize stream disturbance and reduce costs.
- Construct at or near the natural elevation of the streambed to prevent potential flooding upstream of the crossing.

- Install temporary erosion control BMPs in accordance with erosion control BMP fact sheets to minimize erosion of embankment into flow lines.
- Any temporary artificial obstruction placed within flowing water should only be built from material, such as clean gravel or sandbags, that will not introduce sediment or silt into the watercourse.
- Temporary water body crossings and encroachments should be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments should be clean, rounded river cobble.
- Vehicles and equipment should not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed.
- The exterior of vehicles and equipment that will encroach on the water body within the project should be maintained free of grease, oil, fuel, and residues.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate soil stabilization measures.
- Riparian vegetation, when removed pursuant to the provisions of the work, should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble must be removed upon completion of project activities.

5.3.5 Inspection and Maintenance

The following limitations may apply:

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two week intervals in the non-rainy season to verify continued BMP implementation.
- Check for blockage in the channel, sediment buildup or trapped debris in culverts, blockage behind fords or under bridges
- Check for erosion of abutments, channel scour, riprap displacement, or piping in the soil
- Check for structural weakening of the temporary crossings, such as cracks, and undermining of foundations and abutments
- Remove sediment that collects behind fords, in culverts, and under bridges periodically

- Replace lost or displaced aggregate from inlets and outlets of culverts and cellular confinement systems
- Remove temporary crossing promptly when it is no longer needed

5.4 Streambank Stabilization

5.4.1 Description and Purpose

Stream channels, stream banks, and associated riparian areas are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse effects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants to minimize the impact of construction activities on watercourses. Proper planning and procedures for work in and around streams and channels can reduce the potential for discharge of sediment and other pollutants and minimize the impacts of construction activities on watercourses and habitat. Streams on the 303(d) list and listed for sediment may require numerous measures to prevent any increases in sediment load to the stream.

5.4.2 Suitable Applications

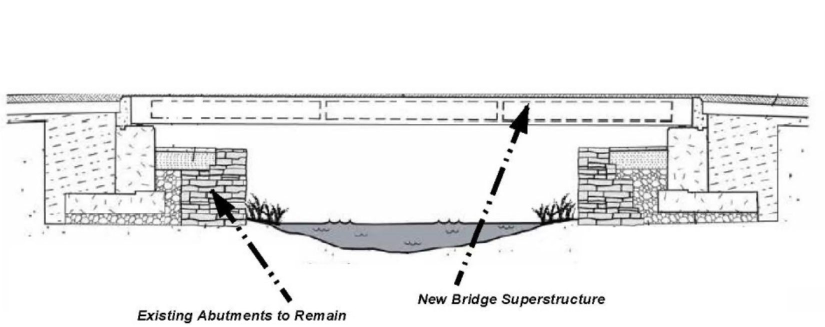
These procedures typically apply to all construction projects that disturb or occur within stream channels and their associated riparian areas. The site-specific stream bank practices used will be partially dependent upon the types of soils present, the slope of the bank, gradient of the river, flow, and uses of the watercourse.

5.4.3 Limitations

- The appropriate time to apply stream bank erosion controls is dependent upon the method used.
- Specific permit requirements or mitigation measures such as 401 Water Quality Certification, U.S. Army Corps of Engineers Section 404 or Section 10 permits, U.S. Coast Guard Section 9 or General Bridge Act Permits and approval by USFWS and NMFS supersede the guidance in this BMP. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.

Retain Existing Bridge Abutment Cross-Section:

Notes:
1) Minimizes new disturbance during the short term.
2) Previous active channel and floodplain widths are maintained.
3) Does not support a riparian margin.
4) Does not allow for any bioengineering features to be Integrated into Design



Remove Existing Bridge Abutment with Channel Improvement Cross-Section:

Notes:
1) Supports Riparian Functions
2) Provides Scour Protection Through Buried Riprap
3) Maintains a Riparian Margin Adjacent to Roadway.
4) Allows Bioengineering Features to be Integrated into Design

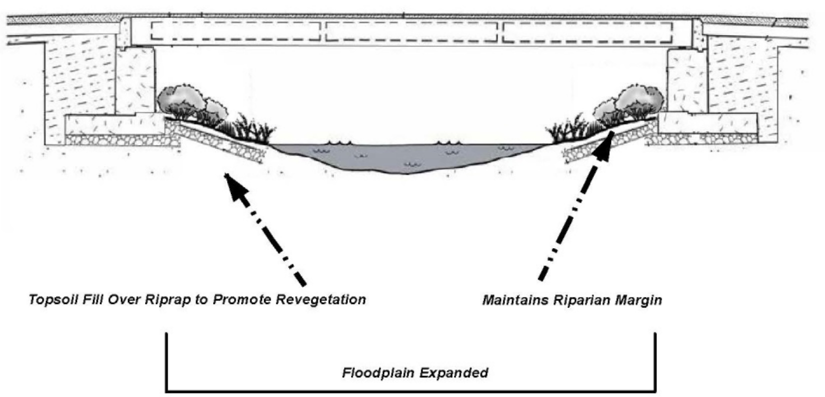


Figure 9. Example of streambank stabilization options during bridge replacement.

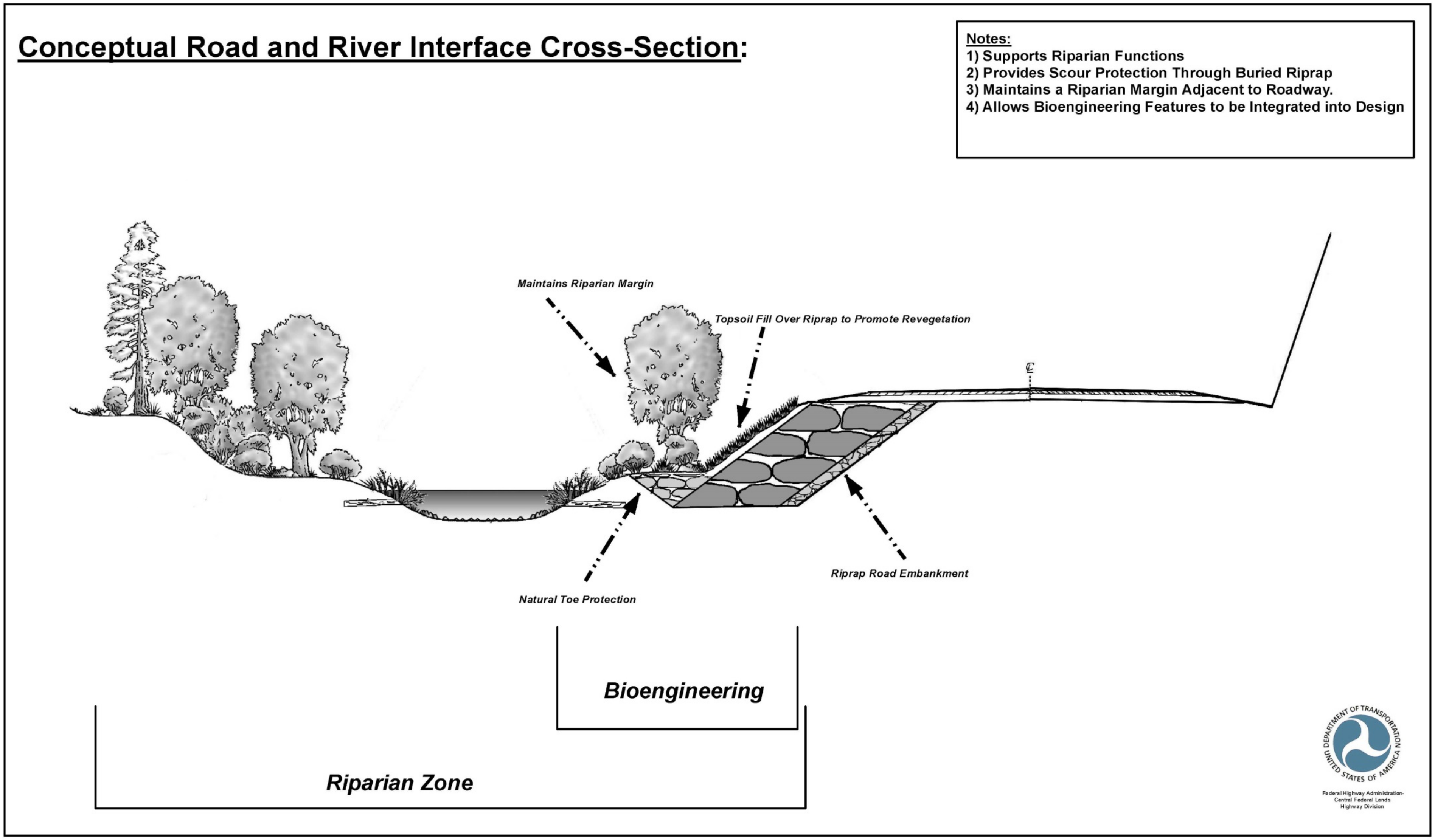


Figure 10. Example of roadway with riprap and bioengineering features.

5.4.4 Implementation

5.4.4.1 Planning

Proper planning, design, and construction techniques can minimize impacts normally associated with streambank construction activities. Poor planning can adversely affect soil, fish, wildlife resources, land uses, or land users. Planning should take into account: scheduling; avoidance/minimization of in-stream construction; minimizing disturbance area and construction time period; using pre-disturbed areas; selecting crossing location; and selecting equipment.

It is important to remember that streams are dynamic. Even without human influence streams may meander, and in the process, cause banks to erode. Therefore, not all eroding banks are “bad” and in need of repair. In fact, the wrong system of BMPs installed in the wrong place may cause more damage downstream (and therefore to the entire stream system) than leaving the stream in its natural state. For example, “hard structures” like large riprap or gabions, placed on one eroding bank, can displace the stream’s energy downstream to a previously stable bank, causing the downstream bank to erode. If this downstream bank is also stabilized with a hard structure, the stream’s energy may be moved further downstream to another previously stable bank, and so on.

So before stabilizing stream banks, consider the cause of the stream bank erosion. If the banks are eroding due to a natural meander, then it may be best to leave the bank alone. If the banks are eroding due to fluctuations in hydrology, the hydrologic fluctuations should be addressed before the banks are stabilized.

Once the cause of erosion is identified and addressed (If possible), determine the goal in stabilizing the stream banks. Some banks are stabilized to protect buildings, land and infrastructure. Others are stabilized to keep soil from entering the stream and to allow recreational or angler access to the stream. The purpose for stabilizing the banks and the users of the stream will help determine the type of structures needed.

Once the above concerns have been addressed, then it is important to work with agencies with expertise in stream bank erosion techniques to address stream bank erosion at the watershed level. Looking at the entire watershed will help prioritize bank stabilization efforts. This is especially important in Hawaii where restoration options must account for Hawaii’s extreme hydrology (steep slopes and intense rainfall regime), extreme channel hydraulics (velocities, shear stress), flood control requirements, and limited space. Design considerations for streambank stabilization techniques should include:

- Channel Grade
- Discharge Frequency
- Discharge Velocities
- Freeboard
- Alignment
- Stream Type and Hydraulic Geometry
- Sediment Load and Bed Material
- Protection Against Failure
- Undermining
- Ends of Revetment
- Debris Removal
- Vegetative Systems

5.4.4.2 Scheduling

Construction activities should be scheduled according to the relative sensitivity of the environmental concerns and in accordance with the Scheduling BMP. Scheduling considerations will be different when working near perennial streams vs. ephemeral streams and are as follows.

When in-stream construction is conducted in a perennial stream, work should optimally be performed during the rainy season. This is because in the summer, any sediment-containing water that is discharged into the watercourse will cause a large change in both water clarity and water chemistry. During the rainy season, there is typically more and faster flowing water in the stream so discharges are diluted faster. However, should in-stream work be scheduled for summer, establishing an isolation area, or diverting the stream, will significantly decrease the amount of sediment stirred up by construction work. Construction work near perennial streams should optimally be performed during the dry season (see below).

When working in or near ephemeral streams, work should be performed during the dry season. By their very nature, ephemeral streams are usually dry in the summer, and therefore, in-stream construction activities will not cause significant water quality problems. However, when tying up the site at the end of the project, wash any fines (see Washing Fines) that accumulated in the channel back into the bed material, to decrease pollution from the first rainstorm of the season.

When working near ephemeral or perennial streams, erosion and sediment controls (see Chapter 4) should be implemented to keep sediment out of stream channel.

5.4.4.3 Minimize Disturbance

Minimize disturbance through: selection of the narrowest crossing location; limiting the number of equipment trips across a stream during construction; and, minimizing the number and size of work areas (equipment staging areas and spoil storage areas). Place non water dependent work areas at least 50 feet (ft) from stream channel to minimize impacts to stream. Field reconnaissance should be conducted during the planning stage to identify work areas.

5.4.4.4 Use of Pre-Disturbed Areas

Locate project sites and work areas in areas disturbed by prior construction or other activity when possible.

5.4.4.5 Selection of Project Site

Select project site that minimizes disturbance to aquatic species or habitat. Try to avoid steep and unstable banks, highly erodible or saturated soils, or highly fractured rock.

5.4.4.6 Equipment Selection

Select equipment that reduces the amount of pressure exerted on the ground surface, and therefore, reduces erosion potential and/ or use overhead or aerial access for transporting equipment across drainage channels. Use equipment that exerts ground pressures of less than 5 or 6 lb/in, where possible. Low ground pressure equipment includes: wide or high flotation tires (34 to 72 in. wide); dual tires; bogie axle systems; tracked machines; lightweight equipment; and, central tire inflation systems.

5.4.5 STREAMBANK STABILIZATION METHODS

Streambanks should be temporarily stabilized using approved soil stabilization and sediment control methods identified in Chapter 4 including but not limited to: preservation of existing vegetation, hydraulic mulch, hydroseeding, soilbinders, strawmulch, geotextiles or mats, silt fence, strawbale barriers, fiber rolls, velocity dissipation devices, slope drains and/or other appropriate erosion and sediment control methods.

There are numerous methods available to permanently stabilize stream banks. Rather than discuss all of them in detail, below is a discussion of the most common practices.

5.4.5.1 Bioengineering

Bioengineering is a method of using vegetation to stabilize a site with or without structural controls. Some refer to bioengineering as softening the traditional rock-the-bank approach because non-invasive vegetation is used to blend the site into its surrounding landscape. Bioengineering techniques may be as simple as installing erosion control blankets, then seeding exposed soil to help prevent soil movement, to full stream restoration plans. Common techniques utilized included:

Table 5: Streambank and Shoreline Stabilization Measures

	Type of Protection and Where Applicable										*Problems Addressed*						
Best Management Practices	Decrease Force	Increase Resistance	Immediate Protection	Protection Below or at Waterline	Streambank	Shoreline	Flat Banks (<2:1)	Steep Banks (>2:1)	Holes, Slumps	Natural Materials Present	Toe Erosioin, Undercutting	Wildlife Habitat	Aquatic Habitat	Water Quality/ Sediment Trap	Saturated Soil	Bare Bank	Overbank Erosion
Bioengineering																	
Fiber Rolls and Fiberschines, Coir Logs		X	X	X	X	X					X	X	X	X			
Brush Mattress		X	X		X	X				X		X		X	X	X	X
Brush Layering or Branch Packing	X	X	X		X	X	X		X	X		X	X	X	X	X	
Brush/Tree Revetment	X	X	X	X	X		X	X									
Brush Trench	X	X	X		X	X	X	X	X	X		X				X	
Stake Plantings		X			X	X	X		X			X		X	X	X	X
Vertical Bundles		X			X	X	X		X			X		X	X	X	X
Live Wattles or Fascines		X			X	X	X		X	X		X		X	X	X	X
Branchpacking	X	X	X		X	X	X		X	X							
Live Cribwall		X	X	X	X	X		X			X	X	X	X	X	X	X
Brushmattress		X	X		X	X				X		X		X	X	X	X
Structural																	
Rock Riffle	X	X	X	X	X		X	X			X		X	X			
Engineered Log Jams and Tree Revetments	X	X	X	X	X					X	X	X	X				

Log, Rootwad, Boulder Revetment	X	X	X	X	X					X		X	X	X			
Post/Pole Planting	X	X	X	X	X					X	X	X			X	X	X
Rock Riprap		X	X	X	X	X	X				X				X	X	X
Rock Gabions			X	X	X	X	X	X			X		X		X	X	
Vanes, Weirs, Barbs	X		X	X	X		X				X		X	X			
Notes: X = BMP may be applicable to activity																	

In a stream bank and shoreline environment, bioengineering and preservation of existing vegetation provides the following benefits:

5.4.5.1.1 *Water Quality Protection:*

Vegetated buffers on slopes trap sediment and promote groundwater recharge. The buffer width needed to maintain water quality ranges from 15 to 100 ft. On gradual slopes, most of the filtering occurs within the first 30ft. Steeper slopes require a greater width of vegetative buffer to provide water quality benefits.

5.4.5.1.2 *Streambank Stabilization*

The root system of riparian vegetation stabilizes stream banks by increasing tensile strength in the soil. The presence of vegetation modifies the moisture condition of slopes (infiltration, evapotranspiration, interception) and increases bank stability.

5.4.5.1.3 *Riparian Habitat*

Buffers of diverse riparian vegetation provide food and shelter for riparian and aquatic organisms. Minimizing impacts to fisheries habitat is a major concern when working near streams and rivers. Riparian vegetation provides shade, shelter, organic matter (leaf detritus and large woody debris), and other nutrients that are necessary for fish and other aquatic organisms. Buffer widths for habitat concerns are typically wider than those recommended for water quality concerns (100 to 1,500 ft).

When working near watercourses, it is important to understand the work site's placement in the watershed. Riparian vegetation in headwater streams has a greater impact on overall water quality than vegetation in downstream reaches. Preserving existing vegetation upstream is necessary to maintain water quality, minimize bank failure, and maximize riparian habitat, downstream of the work site.

5.4.5.1.4 *Installation*

As a general rule, the width of a buffer strip between a road and the stream is recommended to be 50 ft plus four times the percent slope of the land, measured between the road and the top of stream bank.

5.4.5.2 Riprap

Riprap is one of the more commonly used stream bank stabilization techniques. It is a permanent cover of rock used to stabilize stream banks, provide in-stream channel stability, and provide a stabilized outlet below concentrated flows. It is generally used on stream banks at the toe (bottom) of the slope, with other structures placed up-slope to prevent soil movement. It is often a component of many soil bioengineering techniques listed above.

Riprap stabilization designs should include appropriate bank slope and rock size to protect the bank from wave and current action and to prolong the life of the embankment. A final slope ratio of at least 1:2 (vertical to horizontal) is recommended, and a more stable 1:3 slope should be used where possible. However, steeper slopes may be appropriate.

A layer of gravel, small stone, or filter cloth placed under and/or behind the rock helps prevent failure. In many cases, only the toe of the slope may need rock reinforcement; the remainder can be planted with native vegetation.

5.5 Clear Water Diversion and Isolation Techniques

5.5.1 Description and Purpose

Clean water diversions are used to minimize water quality degradation by keeping clean water away from active construction sites. These diversions temporarily intercept and reroute water to 1) isolate surface waters from a construction area that is in or adjacent to water, or 2) divert upslope runoff around an active construction site or one that is newly constructed, unstable, unprotected, or recently seeded, and discharge downstream or down gradient to a protected outlet. They will divert surface waters until the construction is completed, BMPs are installed, and/or slopes are stabilized with vegetation and mulch.

Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion. Clear water diversions are used in a waterway to isolate and confine construction area and reduce sediment pollution from construction work occurring in or adjacent to water. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes. This guidance will summarize these common practices as well as; identify suitable applications, limitations, standards and specifications, and inspection and maintenance of these practices.

5.5.2 Design Considerations

5.5.2.1 Construction Sites:

- Plan in advance for stable discharge of runoff collected in diversions. Discharge points must have outlet protection or energy dissipaters.
- Reduce diversion gradient to reduce water velocity.
- Size clean water diverters adequately for the catchment drainage size.
- Ensure that all diversion pipe connections are completely sealed and conduits are staked securely to the slope. Pipes are preferred to flumes for spill control.
- Ensure that any substance used to assemble or maintain diversion structures (e.g. form oil) or used to minimize seepage beneath these structures (e.g. grout) are non-toxic, non-hazardous, and neutral pH to minimize contamination of clean water.

5.5.2.2 Streams

- Schedule construction for periods of low flows, or when the stream is dry if possible. Consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to vegetation irrigation.
- Always allow sufficient flow to pass to maintain aquatic life downstream. Never completely dam stream flow during isolation of a stream reach for construction.
- Never harm or remove riparian vegetation, unless approved by the permitting authority.

- Consider potential impacts to the stream channel or water body before installing diverters. Select less intrusive methods.
- Do not park equipment below the high water mark of a water body, unless approved by the permitting authority.
- Stabilize embankment slopes and diversion ditches with liners such as geotextiles, erosion control blanket systems, rock slope protection, or other slope stabilization materials in areas where erosion is anticipated.
- Avoid disturbing aquatic species during installation, dewatering, maintenance, or removal of clean water diverters. Maintain adequate flow downstream to support aquatic life.

5.5.3 Suitable Applications

A clear water diversion is typically implemented where appropriate permits (Section 10, Section 404, and Section 401 WQC) have been secured and work must be performed in a flowing stream or water body.

- Clear water diversions are appropriate for isolating construction activities occurring within or near a water body such as streambank stabilization, or culvert, bridge, pier or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.
- Temporarily intercept and divert upslope runoff around construction areas and discharge to stable point downslope.
- Suitable for conveying runoff down steep slopes, particularly cut-and-fill slopes.
- Useful for diverting, removing, and treating sediment-laden water encountered during construction.
- Pumped diversions are suitable for intermittent and low flow streams.
- Excavation of a temporary bypass channel, or passing the flow through a heavy pipe (called a “flume”) with a trench excavated under it, is appropriate for the diversion of streams less than 20 ft wide, with flow rates less than 100 cubic feet per second (cfs).

5.5.4 Limitations

- Diversion and encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Specific permit requirements or mitigation measures such as 401 Water Quality Certification, U.S. Army Corps of Engineers Section 404 or Section 10 permits, U.S. Coast Guard Section 9 or General Bridge Act Permits and approval by USFWS and NMFS supersede the guidance in this BMP. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Special permits or mitigation measures may be required.
- Diversion and encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts. Diversion structures

should not be installed without identifying potential impacts to the stream channel.

- Diversion or isolation activities are not appropriate in channels where there is insufficient stream flow to support aquatic species in the area dewatered as a result of the diversion.
- Diversion or isolation activities are inappropriate in deep water unless designed or reviewed by a hydraulic engineer.
- Diversion or isolation activities should not completely dam stream flow.
- Dewatering and removal may require additional sediment control or water treatment. See SM-17, Dewatering Operations.
- Not appropriate if installation, maintenance, and removal of the structures will disturb sensitive aquatic species of concern.

5.5.5 Standards and Specifications

There are two types of clean water diversions: (1) The diversion method involves intercepting clean runoff water from upslope, diverting it around a construction area, and conveying it by various means to a stable discharge point down slope. (2) The isolation method, on the other hand, uses various techniques to isolate and dewater a construction area that exists in a stream, lake, or other water environment.

5.5.6 General Considerations

- Implement the streambank stabilization guidelines to minimize impacts to streambanks.
- Divert clear water to clear water. This means that a diversion should be of sufficient length to completely bypass the area impacted by construction. If clear water is returned to a waterway too soon, it will exacerbate the sediment control problem rather than mitigating it by increasing the volume of sediment laden water on the job site.
- Where working areas encroach on flowing streams, barriers adequate to prevent the flow of muddy water into streams should be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams should be held to a minimum.
- Where possible, diversion/encroachment impacts should be avoided or minimized by scheduling construction during periods of low-flow or when the stream is dry (see also the project special provisions for scheduling requirements). Scheduling should also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc.
- Heavy equipment driven in wet portions of a water body to accomplish work should be completely clean of petroleum residue, and water levels should be below the fuel tanks, gearboxes, and axles of the equipment unless lubricants

and fuels are sealed such that inundation by water will not result in discharges of fuels, oils, greases, or hydraulic fluids.

- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of the crane/ excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe should not enter the water body except as necessary to cross the stream to access the work site.
- Stationary equipment such as motors and pumps located within or adjacent to a water body should be positioned over drip pans.
- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water should, at all times, be allowed to pass downstream to maintain aquatic life.
- The exterior of vehicles and equipment that will encroach on a water body within the project should be maintained free of grease, oil, fuel, and residues and may require vegetable based hydraulic oil.
- Equipment should not be parked below the high water mark unless allowed by a permit.
- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations, and as shown on the project plan sheets (i.e. construction limits). Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate erosion control/soil stabilization measures.
- Riparian vegetation approved for trimming as part of the project should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble should be removed upon completion of project activities.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- Where possible, avoid or minimize diversion and encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. Scheduling should also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.
- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, oil or other petroleum products.
- • A “Diversion Plan” should be submitted to the Project Engineer for review prior to commencing any clear water diversion activities. This plan should include, at a minimum, the following:
    - Predicted diversion flow rates
    - Pump capacities (if required)

- Material to be used (i.e., piping, plastic sheeting)
- Appropriate permits and approvals (as required)
- Contingency plans
- Additional BMP(s) (as required)
- Removal and restoration plan

5.5.6.1 Stream Isolation Techniques (Temporary Dry Construction Areas)

Isolation techniques are methods that isolate near shore work from a waterbody. Techniques include sheet pile enclosures, water-filled geotextile (Aqua Dam), gravel berm with impermeable membrane, gravel bags, coffer dams, and K-rail.

The selection of which stream diversion or Isolation technique to use will depend upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project. Costs of clear water diversion vary considerably and can be very high. Manufactured diversion structures should be installed following manufacturer's specifications.

5.5.6.1.1 Filter Fabric

A relatively inexpensive isolation method is filter fabric isolation. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place. This method should be used in relatively calm water, and can be used in smaller streams. Note that this is not a dewatering method, but rather a sediment isolation method.

5.5.6.1.2 Turbidity Curtain:

A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out. Turbidity curtains should be used where sediment discharge to a stream is unavoidable.

5.5.6.1.3 K-rail River Isolation:

K-rails are shaped concrete barriers that can be used to isolate an in-stream or near bank construction area or to form a sediment deposition area. The method can be used in streams with higher water velocities than allowable with many other isolation techniques, but it does not allow for full dewatering.

5.5.6.1.4 Sheet Pile Enclosures:

Sheet metal piles are installed in water to provide a waterproof area for full dewatering. This technique is useful in large streams and lakes. This technique is relatively expensive and staging and heavy equipment access areas are necessary.

5.5.6.1.5 Water-Filled Geotextile (Aqua Dam):

This technique allows for partial dewatering of in-stream/lake or near bank construction areas and can be used for small streams to large rivers. An aqua dam consists of a geotextile bag with two separate sections that is placed in water. Each section is then filled with water to reach above the high water level, preventing movement of the bag. Aqua dams are lightweight, easy to transport, reusable, and easy to install.

5.5.6.1.6 Gravel Berm with Impermeable Membrane:

This technique, designed for small streams, allows for partial dewatering of in-stream/lake or near bank construction areas. At the upstream end of the project area, clean washed gravel is placed into the stream to hold in place an impermeable membrane. The area can then be dewatered.

Gravel Bag Berms used in conjunction with an impermeable membrane are cost effective, and can be dewatered relatively easily. If spawning gravel is used, the impermeable membrane can be removed from the stream, and the gravel can be spread out and left as gravel in water habitat if approved in the permit. Only clean, washed gravel should be used for both the gravel bag and gravel berm techniques.

5.5.6.1.7 Gravel Bag:

Overlapping clean and washed gravel filled bags are placed into the water until they reach the height of the high water level. The work area downstream of the gravel bags can then be dewatered. Installation and removal of the gravel bags is labor intensive. Leaks between the gravel bags can also make dewatering an area difficult.

5.5.6.1.8 Coffer dams:

Coffer dams are watertight structures of steel, timber, earth, or other materials built in place to block off the construction area which is normally submerged. These dams are used in a variety of settings, including small to large streams, lakes, and coastal areas. Also, many options are now available and are relatively easy to install.

5.5.6.1.9 Isolation Technique Considerations

- When dewatering behind temporary structures to create a temporary dry construction area, such as cofferdams, pass pumped water through a sediment-settling device, such as a portable tank or settling basin, before returning water to the water body.
- Isolation structures must be in place for life of in-water work. Structures should be installed before work starts and removed after stabilization of in-water work area is complete to avoid impacts to aquatic environment.
- Any substance used to assemble or maintain diversion structures, such as form oil, should be inert, non-toxic and non-hazardous.
- Any material used to minimize seepage underneath diversion structures, such as grout, should be non-toxic, non-hazardous, and as close to a neutral pH as possible.

5.5.6.2 Stream Diversion Techniques

In conjunction with isolating and dewatering the work area in a stream reach, surface water upstream may be diverted around the work area and discharged downstream. There are three types of stream diversions. The stream diversion technique to use depends upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project. The three stream diversion techniques are:

5.5.6.2.1 Pumped diversions:

Effective for de-watering in relatively flat terrain. Pump capacity must be sufficient for design flow. Pumps require frequent monitoring.

5.5.6.2.2 Pipe/Flume diversions:

Requires moderate slope to generate adequate stream velocity to move water through the pipe/flume to the discharge area.

5.5.6.2.3 Dam-type or excavated diversions:

Water is diverted by temporary dams constructed above and below the work site. Dams must be constructed of erosion resistant materials such as steel plate, sheet pile, washed gravel bags, continuous berms, inflatable water bladders, and similar.

5.5.6.2.4 Diversion Technique Considerations

- When constructing a diversion channel, begin excavation of the channel at the downstream end and work upstream. Once the watercourse to be diverted is reached, and the excavated channel is stable, breach the upstream end, and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.
- All stream diversions will need to have a barrier installed to block the water and force it into the diversion (Refer to Stream Isolation Techniques above). Carefully evaluate site conditions to select type of diversion to use and installation specifications. Size diversions to convey design flood flows. Provide adequate energy dissipation at the outlet to minimize erosion.
- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with standard specifications for Geotextiles and Mats, or use rock slope protection.
- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment and slope protection, or other temporary soil stabilization methods.
- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See standard specifications for Velocity Dissipation Devices.

5.6 Filter Fabric Isolation Technique

5.6.1 Definition and Purpose

A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel bags, and steel t-posts.

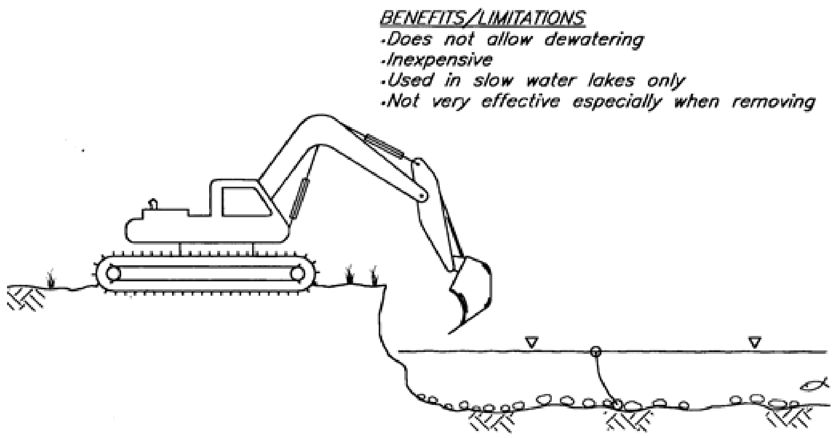


Figure 11: Geotextiles, Silt Barriers, Curtain Enclosure Method.

5.6.2 Appropriate Applications

- Filter fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.
- Filter fabric isolation is relatively inexpensive. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place.
- If spawning gravel is used, all other components of the isolation can be removed from the stream, and the gravel may be spread out and left as gravel stream habitat if approved in the permit. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.
- This method should be used in relatively calm water, and can be used in smaller streams.
- This is not a dewatering method, but rather a sediment isolation method.
- Water levels inside and outside the fabric curtain must be about the same, as differential heads will cause the curtain to collapse.

5.6.3 Limitations

- Do not use if the installation, maintenance and removal of the structures will disturb sensitive aquatic species of concern.
- Filter fabrics are not appropriate for projects where dewatering is necessary.

- Filter fabrics are not appropriate to completely dam stream flow.

5.6.4 Standards and Specifications

- For the filter fabric isolation method, a non-woven or heavy-duty fabric (refer to Standard Specification FP-14, Section 713) is required over standard silt fence. Using rolled geotextiles allows non-standard widths to be used.
- Anchor filter fabric with gravel bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream, where it can provide aquatic habitat benefits. If a sandbag splits open in a watercourse, the sand could cause a decrease in water quality, and could bury sensitive aquatic habitat. Exceptions may apply if streambed is composed of sand and similar sand material is used to fill bags.
- Another anchor alternative is a continuous berm, made with the Continuous Berm Machine. This is a gravel-filled bag that can be made in very long segments. The length of the berms is usually limited to 20 ft for ease of handling (otherwise, it gets too heavy to move).

5.6.5 Installation

- Place the fabric on the bottom of the stream, and place either a bag of clean, washed gravel or a continuous berm over the bottom of the silt fence fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.
- Pull the fabric up, and place a metal t-post immediately behind the fabric, on the inside of the isolation area; attach the silt fence to the post with three diagonal nylon ties.
- Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 ft.

5.6.6 Inspection and Maintenance

- Conduct inspections as required by the NPDES, 404 permit, 401 WQC or contract specifications. At a minimum, during construction inspect daily during the workweek.
- Schedule additional inspections during and after storm events.
- Immediately repair any gaps, holes or scour.
- Remove and properly dispose of sediment buildup.
- Remove BMP upon completion of construction activity. Recycle or reuse if applicable.
- Revegetate areas disturbed by BMP removal if needed.

5.7 Turbidity Curtain Isolation Technique

5.7.1 Definition and Purpose

A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.

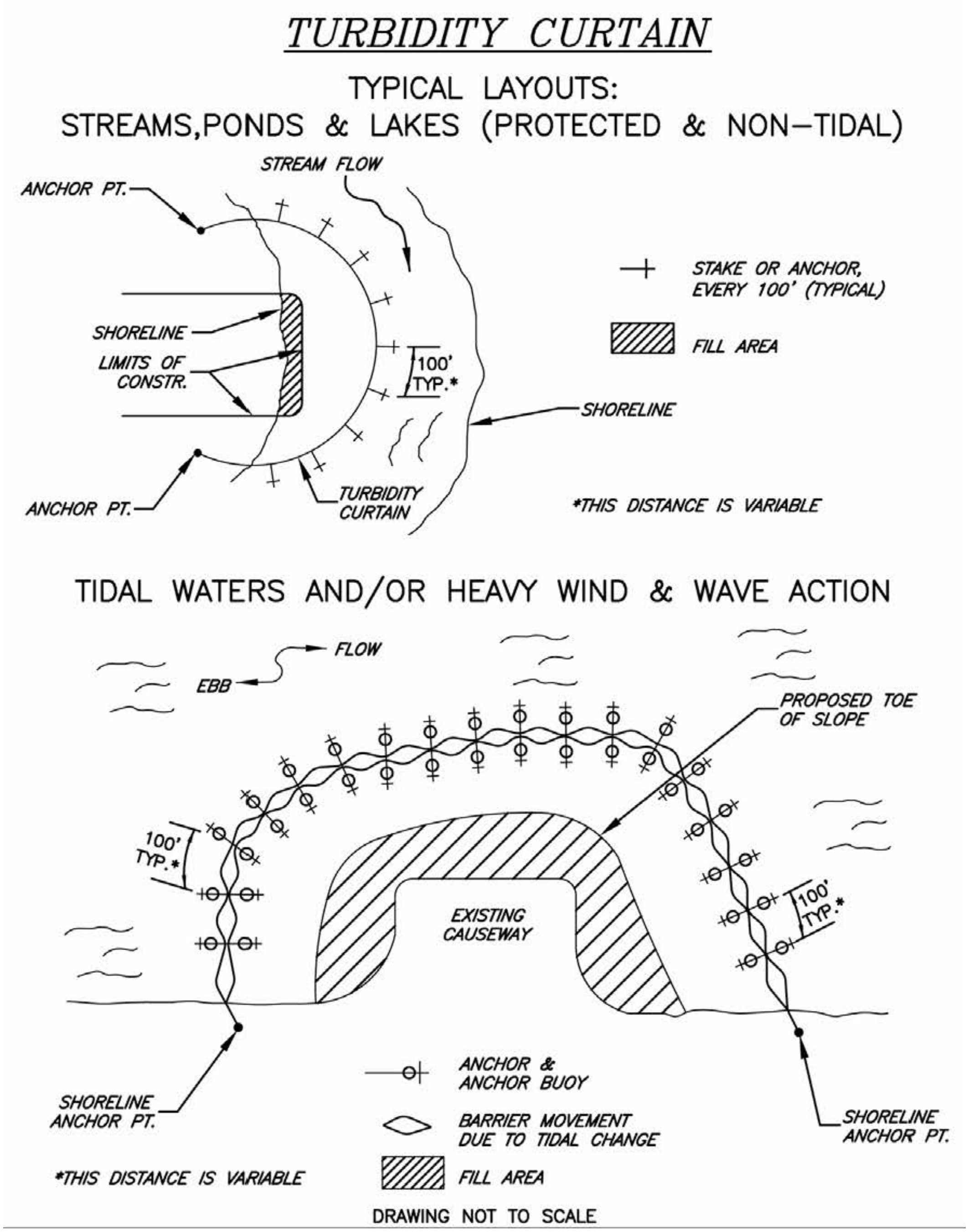


Figure 12: Turbidity Curtain Enclosure Method.

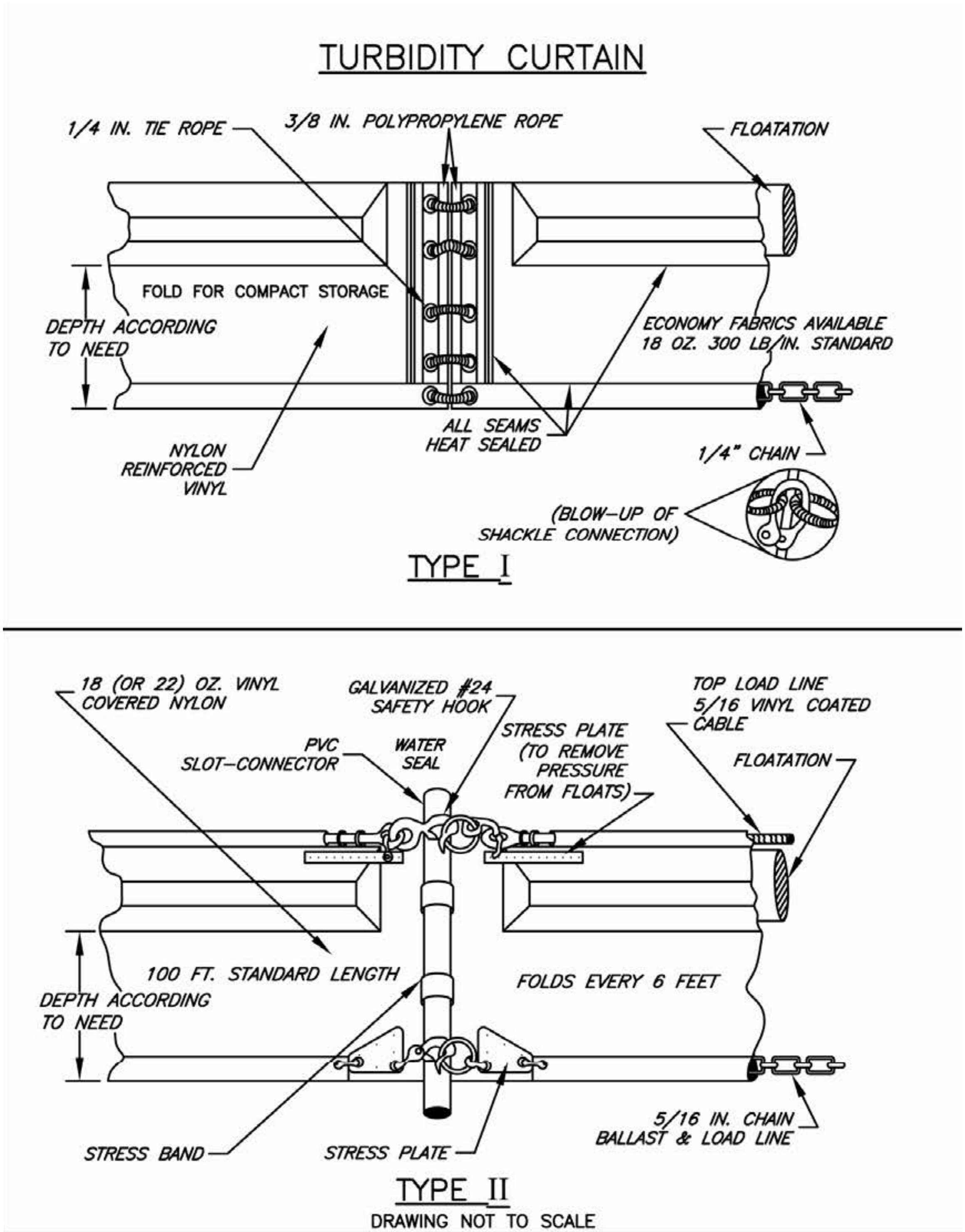


Figure 13: Turbidity Curtain Enclosure Method.

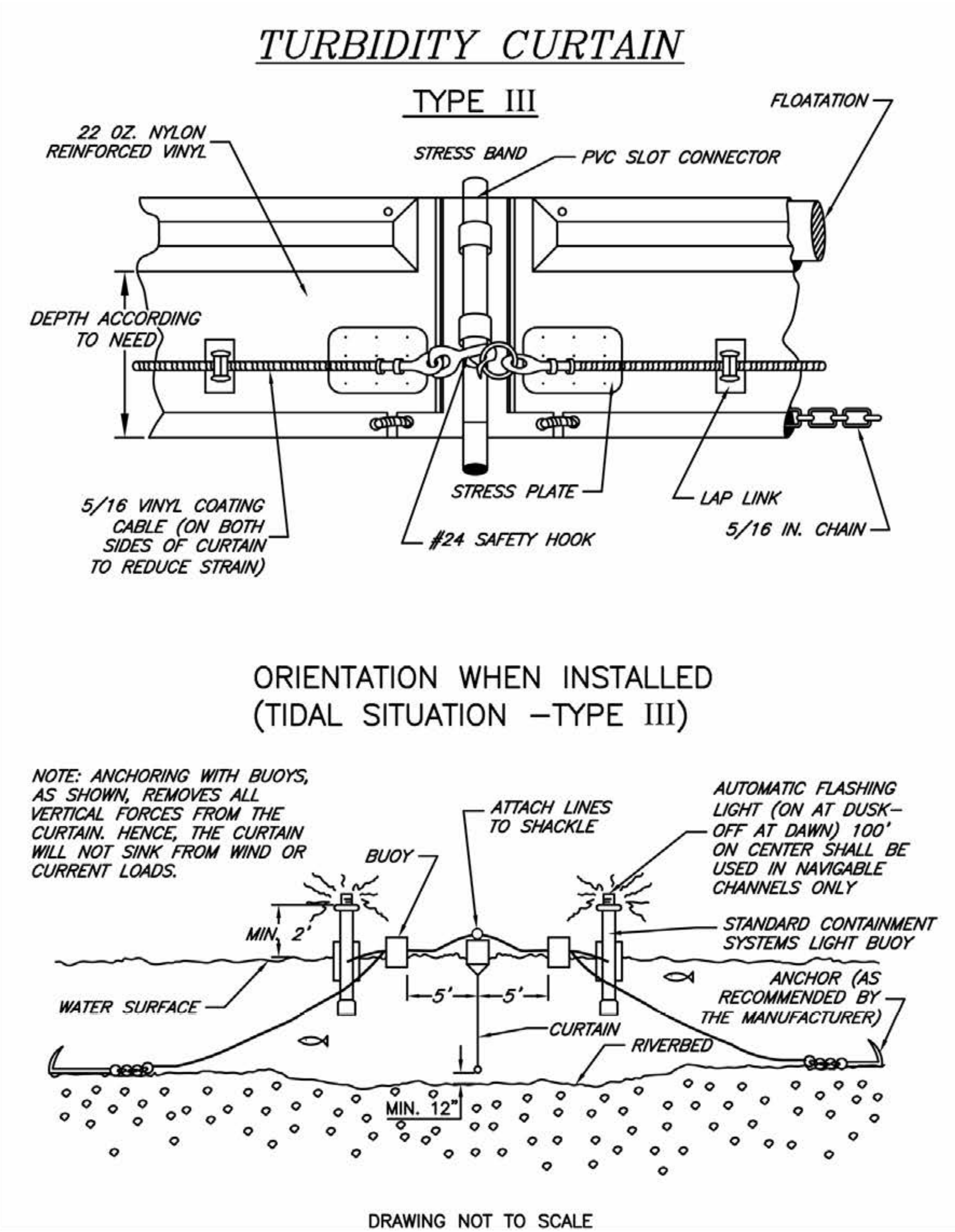


Figure 14: Turbidity Curtain Enclosure Method.

5.7.2 Appropriate Applications

- Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, and slow flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the sediment particles will fall out of suspension.
- These BMPs are designed and selected for specific flow conditions. For sites with flow velocities or currents greater than 5 feet per second, a qualified engineer and product manufacturer shall approve of the use.

5.7.3 Limitations

- May be insufficient as a primary isolation technique and may be better suited for use in conjunction with other isolation or confinement techniques
- Turbidity curtains should not be used in flowing water; they are best suited for use in ponds, lakes, and very slow-moving rivers.
- Turbidity curtains should not be placed across the width of a channel unless they are specifically engineered to withstand expected flows and approved by project engineer.
- Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the re-suspension of particles and by accidental dumping by the removal equipment.

5.7.4 Standards and Specifications

- Turbidity curtains shall be installed parallel to the flow of the watercourse, allowing for 10 to 20 percent variance in the straight-line measurements. Allow for at least 50 feet between joints in the curtain and no more than 100 feet between anchor or stake locations.
- The curtain should extend the entire depth of the watercourse in calm-water situations.
- In wave conditions, the curtain should extend to within 1 ft of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 1 ft.
- Multiple concentric curtains, in some cases both top-down and bottom-up, may be necessary to fully contain sediment during in-water work.
- Turbidity monitoring shall be conducted to evaluate curtain effectiveness, and contingency measures shall be implemented immediately if suspended sediment escapes in excess of allowable limits.
- Turbidity curtains shall extend the entire depth of the watercourse. In significant wind, wave, or tidal action areas, a 10- to 12-foot depth is the most practical because of fabric and mooring anchor strain from the heavy water and sediment loads.

- For tidal situations or in areas heavily impacted by wind-generated wave action, turbidity curtains shall have slack to follow the rise and fall of the water level without submerging. Curtains shall also maintain adequate flow-through, usually by using heavier woven fabric for the bottom sections of the curtain.
- Materials shall be of strong, heavyweight materials that have UV inhibitors. The tensile strength shall be sufficient to withstand predicted flows. All material seams and line attachments shall be sewn or vulcanized welded into place. Materials shall be of bright colors, when applicable, to attract attention of boaters or swimmers using areas near the worksite. Flotation devices for turbidity curtains shall be flexible, buoyant units contained in an individual flotation sleeve or collar attached to the curtain. Flotation devices shall be secured to prevent shifting and ensure proper flotation along the entire length of the curtain.
- Turbidity curtains shall be anchored by vinyl-sheathed steel cable at the top, with a breaking strength as per engineer specifications, but 10,000 pounds at the minimum. At the bottom, a load line with chain incorporated into the bottom hem of the curtain shall be used for ballast to hold the curtain vertical.
- Shoreline turbidity curtain anchors and instream sediment mats shall be anchored by chains, 2x4-foot wood, or 1.33 pounds/linear foot metal stakes. Bottom anchors for turbidity curtains shall hold the curtain in position and may be any of the following anchor types: plow, fluke, mushroom, or grappling hook. All instream anchors shall have a floating anchor buoy or other identifying mark.
- Best installation is achieved by setting the upstream anchor points first, then unfurling the fabric, letting the flow carry the fabric downstream or to a vertical position for turbidity curtains.
- The anchors should first be placed, and then the fabric should be towed out in a furled condition and connected to the anchors. The anchors should be connected to the flotation devices, not to the bottom of the curtain. Once in place, the furling lines should be cut, and the bottom of the curtain should be allowed to sink.
- Sediment shall be allowed to settle for a minimum of 6 to 12 hours before BMP removal or cleaning. All cleaning operations shall also use good sediment control practices. However, consideration must be given to the potential for re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles trapped by the turbidity curtain be removed only if there has been a significant change in the original contours of the affected area in the watercourse.
- Consider sizing materials adequately to allow maintenance to occur only before removal and not throughout the project.

5.7.4.1 Removal Specifications

- Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the turbidity curtain.

- All materials shall be removed at low flows and in a way that scoops and traps sediments within the fabric. The removal area shall be clear of any obstructions that could tear the fabric.
- For curtains, consider pulling the bottom line and top lines in together like a parachute to pull soils ashore.
- Spoils shall be reused and controlled for erosion on a nearby bank or upland area needing stabilization.

5.7.5 Inspection and Maintenance

- Inspect turbidity curtains as least daily during in-water work. Immediately repair floats, fabric, or seams to maintain a fully intact barrier. Conduct inspections as required by the NPDES, 404 permit, 401 WQC or contract specifications.
- The curtain should be inspected for holes or other problems, and any repairs needed should be made promptly. Follow the manufacturer's instructions for fabric and material repair.
- Allow sediment to settle for 6 to 12 hours prior to removal of sediment or curtain. This means that after removing sediment, wait an additional 6 to 12 hours before removing the curtain.
- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water.

5.7.5.1 Signs of Failure

Symptoms	Cause	Solution
Turbid water releasing from curtain.	• Bottom anchor is loose or gone. • Joints/overlaps are loose. • Floatation is gone/ diminished. • Curtain material is torn.	• Repair/replace parts as needed. • Reevaluate curtain strength versus strength of water flows.

5.8 K-Rail (Jersey Barrier) River Isolation Technique

5.8.1 Definition and Purpose

This temporary sediment control or stream isolation method uses K-rails to form the sediment deposition area, or to isolate the in-stream or near-bank construction area.

Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

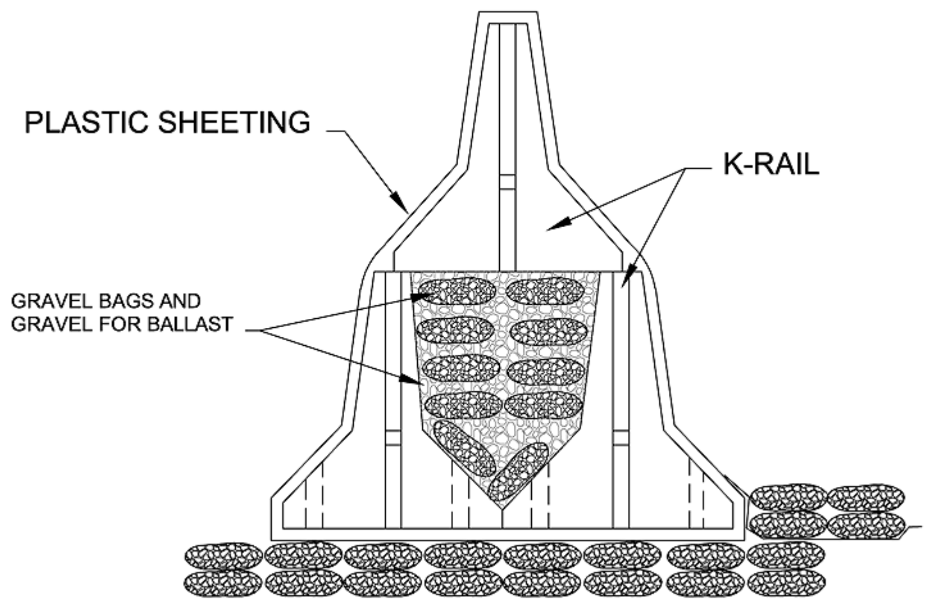


Figure 15: K-Rail Isolation Method.

5.8.2 Appropriate Applications

- The K-rail isolation can be used in streams with higher water velocities than many other isolation techniques.
- This technique is also useful at the toe of embankments, and cut or fill slopes.

5.8.3 Limitations

- The K-rail method should not be used to dewater a project site, as the barrier is not watertight. Refer to standard specifications for construction dewatering techniques.

5.8.4 Standards and Specifications

- To create a floor for the K-rail, move large rocks and obstructions. Place washed gravel and gravel-filled bags to create a level surface for K-rails to sit. Washed gravel should always be used.
- Place the bottom two K-rails adjacent to each other, and parallel to the direction of flow; fill the center portion with gravel bags. Then place the third K-rail on top of the bottom two (See Figure 15). There should be sufficient gravel bags between the bottom K-rails such that the top rail is supported by the gravel. Place plastic sheeting around the K-rails, and secure at the bottom with gravel bags.
- Further support can be added by pinning and cabling the K-rails together. Also, large riprap and boulders can be used to support either side of the K-rail, especially where there is strong current.

5.8.5 Inspection and Maintenance

- Conduct inspections as required by the NPDES, 404 permit, 401 WQC or contract specifications.
- The barrier should be inspected and any leaks, holes, or other problems should be addressed immediately.
- Sediment should be allowed to settle for at least 6 to 12 hours prior to removal of sediment, and for 6 to 12 hours prior to removal of the barrier.

5.9 Cofferdam and/or Sheet Pile Isolation Technique

5.9.1 Definition and Purpose

Coffer dams and Sheetpile walls are temporary structures built into a waterway to contain or divert movement of water and to provide a reasonably dry construction area. Coffer dams are commonly made of steel sheet pile, rock, gabions, concrete jersey barriers, vinyl tubes filled with water, or wood and may be lined with geotextile, plastic sheeting, or other materials to prevent water from entering the construction area.

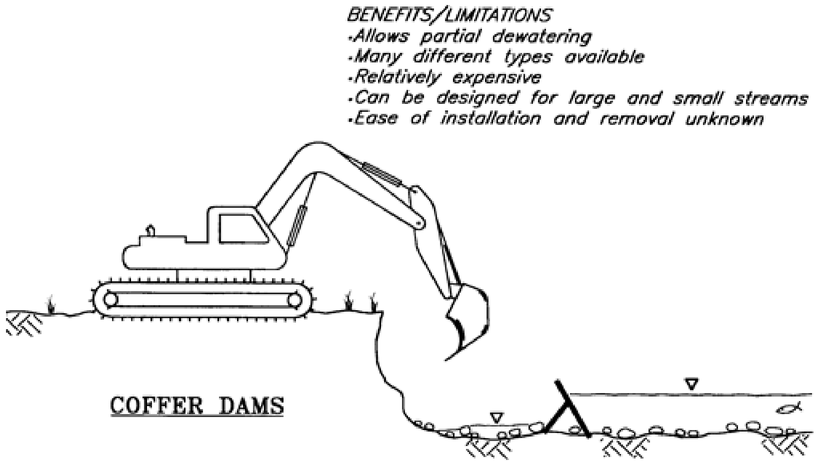


Figure 16: Coffer Dam Isolation Method.

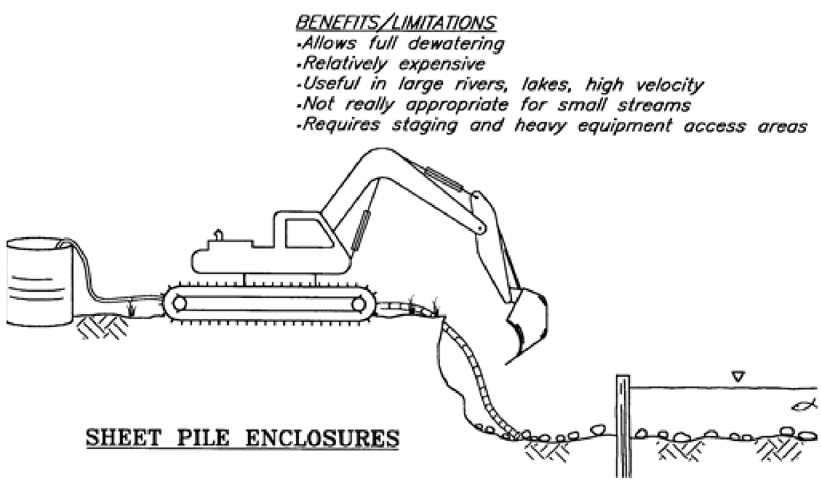


Figure 17: Sheet Pile Isolation Method.

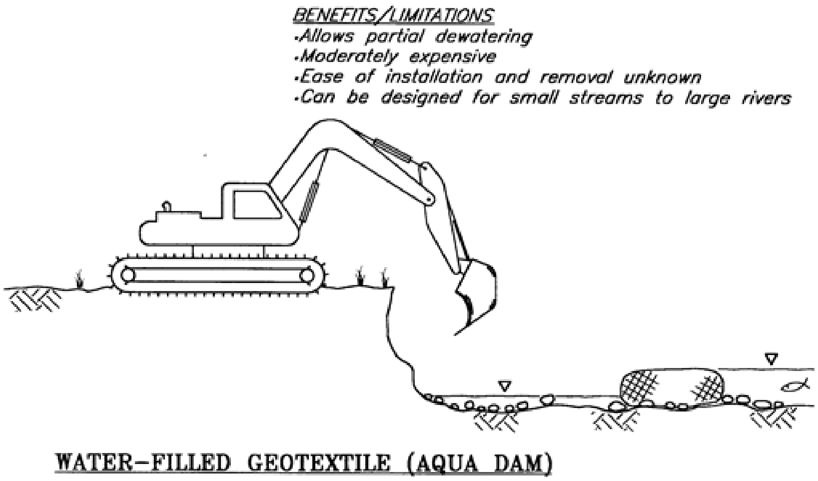


Figure 18: Water-Filled Geotextile (Bladder Dam).

5.9.2 Appropriate Applications

- Where dewatering is necessary.
- Work areas that require isolation from flows.
- Often used in conjunction with stream diversion techniques.

5.9.3 Limitations

- Under some conditions, the design must be developed or approved by a qualified licensed engineer.
- The coffer dam should be sturdy enough to withstand anticipated water pressure, shear stresses and scouring.

5.9.4 Standards and Specifications

- Site specific design is required for a coffer dam.
- Coffer dams should be designed to withstand currents and scour conditions expected under normal stream flow and annual high water. The functional life expectancy is generally 6 months or less.
- Construction materials commonly include steel sheet piles, rock, vinyl tubes, or wood. Piling could consist of standard steel sheet interlocked and driven into the soil or anchored to bedrock. Wooden structures may consist of planks or wood timbers. Concrete jersey barriers may be used, depending on the anticipated water flow, depth and appropriate fit and contact with the stream bed.
- The water side of the coffer dam may be lined with plastic sheeting or some other suitable material that would prevent water passage into the construction area.
- The coffer dam should be built as shown on the plans. Field adjustments should be made as necessary. Water-filled Geotextile (bladder dams) should be installed

following manufacturer's recommendations and guidelines. Rocks or sharp objects should be removed prior to installation.

- If dewatering is required while utilizing a coffer dam, meet dewatering requirements of the NPDES permit and/or 404 permits.

5.9.5 Inspection and Maintenance

- Conduct inspections as required by the NPDES, 404 permit, 401 WQC or contract specifications.
- Remove accumulated sediment and debris regularly and just prior to removing the coffer dam.
- Conduct required dewatering operations such that all permitting requirements are met.
- Upon removal of the coffer dam, stabilize the area and streambed and restore to as near-natural condition as possible. This may require some form of rock riprap and permanent revegetation if the stream bank has been disturbed.

5.10 GRAVEL/ROCK BERM WITH IMPERMEABLE MEMBRANE ISOLATION TECHNIQUE

5.10.1 DEFINITION AND PURPOSE

This temporary sediment control or stream isolation method uses a gravel or rock berm with an impermeable membrane to isolate the in-stream or near-bank construction area.

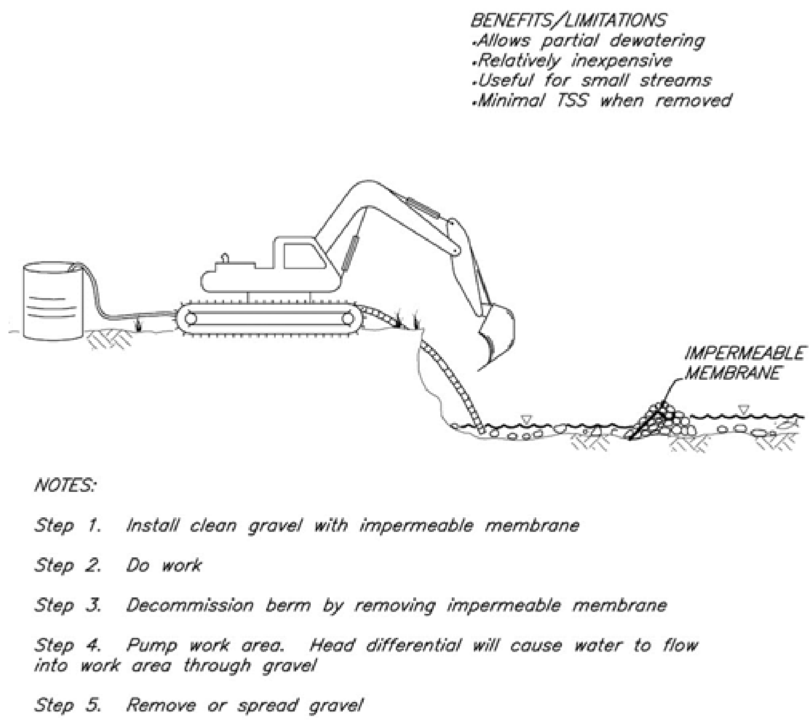


Figure 19: Gravel/Rock Berm with Impermeable Membrane.

5.10.2 APPROPRIATE APPLICATIONS

- Where dewatering is necessary.
- Work areas that require isolation from flows.

5.10.3 LIMITATIONS

- Under some conditions, the design must be developed or approved by a qualified licensed engineer.
- The gravel/rock size should be sturdy enough to withstand anticipated water pressure, shear stresses and scouring.

5.10.4 STANDARDS AND SPECIFICATIONS

- Installation guidelines will vary based on existing site conditions and type of diversion used.

- Gravel berm should be designed to withstand currents and scour conditions expected under normal stream flow and annual high water.
- The impermeable barrier imbedded within the berm should be made of plastic sheeting or some other suitable material that would prevent water passage into the construction area.

5.10.5 INSPECTION AND MAINTENANCE

- Conduct inspections as required by the NPDES, 404 permit, 401 WQC or contract specifications.
- Conduct required dewatering operations such that all permitting requirements are met.
- Check for any erosion and/or undercutting around the inlet and outlet structures, repair as needed.
- Remove accumulated sediment and debris regularly and just prior to removing the coffer dam.
- Upon decommissioning of the gravel/rock berm, stabilize the area and streambed and restore to as near-natural condition as possible. This may require some form of rock riprap and permanent revegetation if the stream bank has been disturbed.
- Inspect berm before and after large storms, and inspect daily during construction. Visually inspect for clogging, damage to linings, accumulation of debris, and adequacy of slope protection. Remove debris and repair linings and slope protection as required. Repair holes, gaps, or scour.
- Upon completion of work, remove the diversion or isolation structure and redirect flow back into the original stream channel.

5.11 Gravel bag or Sandbag Isolation Technique

5.11.1 Definition and Purpose

A sandbag barrier is a temporary linear sediment barrier consisting of stacked gravel bag/sandbags, designed to intercept and slow the flow of sediment-laden sheet flow runoff. Gravel bag / Sandbag barriers allow sediments to settle from runoff before water leaves the construction site. Large gravel bag / sandbag barriers can also be used for in-water work and/or water diversions if site conditions allow.

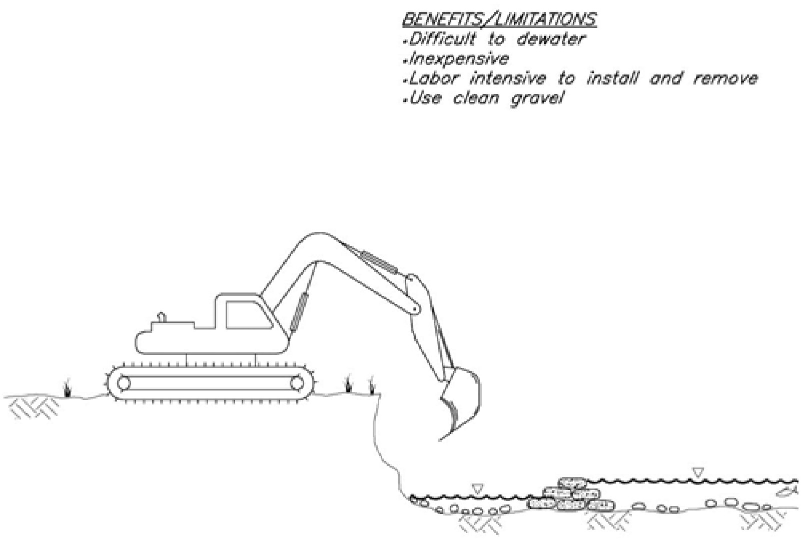


Figure 20: Gravel Bag / Sand Bag Method

5.11.2 Appropriate Applications

- To divert or direct flow or create a temporary sediment/de-silting basin.
- During construction activities in stream beds when the contributing drainage area is typically less than 5 acres.
- To capture and detain non-stormwater flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged, or incomplete curbs.

5.11.3 LIMITATIONS

- The drainage area upstream of the barrier should be limited to 5 acres.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor-intensive.
- Limited durability of bag material.
- When used to detain concentrated flows, maintenance may increase.

5.11.4 STANDARDS AND SPECIFICATIONS

- Installation guidelines will vary based on existing site conditions and type of diversion used.
- **Bag Material:** Bags should be woven canvas, geotextile, or burlap material that is UV-resistant and impermeable. Minimum unit weight 4 ounces per square yard; Mullen burst strength exceeding 300 psi in conformance with the requirements in ASTM designation D3786; minimum water flow rating of 145 gallons per minute per foot in conformance with the requirements in ASTM D4491; and ultraviolet stability exceeding 70 percent in conformance with the requirements in ASTM designation D4355.
- **Fill Material:** Use clean gravel or sand (if more suitable based on site conditions) to fill bags Fill material should be inert and easily recoverable if spilled (minimum 3" aggregate for gravel). Fill should be inert clean and free from clay balls, organic matter, and other deleterious materials that could leach from the bag. Fill material is subject to approval by the Engineer.
- Place bags in a manner that causes the least amount of disturbance to the stream bed. Applicable in waters with smooth bed surfaces where bag can create seal along bottom.

5.11.5 INSPECTION AND MAINTENANCE

- The barrier should be inspected and any leaks, holes, or other problems should be addressed immediately.
- Conduct inspections as required by any applicable permit or contract specifications.
- Reshape or replace sandbags as needed, or as directed by the Engineer.
- Repair washouts or other damages as needed, or as directed by the Engineer.
- Removed sediment should be incorporated in the project at locations designated by and approved by the Engineer or if deemed contaminated (i.e. hazardous waste) should be disposed of in accordance with federal and state laws.
- Remove sandbags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

5.12 Pipe Piles and Caisson Isolation Technique

5.12.1 Definition and Purpose

Piles and Caissons come in many different forms and are commonly used during construction of transportation structures, including bridges. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction.

5.12.1.1 Piles

Piled foundations are usually the first alternative considered when it is impractical, uneconomical or unsafe to found conventional structure footings at shallow or intermediate depths below ground. There is a sufficiently wide range of piling systems available from which to select appropriate foundation solutions in most types of ground conditions for road bridges which often require deep founding.

Piles are commonly used to construct bridge or other structural foundations. In this use they are able to transmit the applicable combinations of permanent and transient loads which are applied at the top of the piles, through weak compressible soil or fill materials onto stiff or dense soil strata or rock at lower levels, in such a manner as to prevent excessive settlement, horizontal displacement or rotation of the supported structure.

Driven piles are usually slender, 'column like' structural members (usually acting in groups) which are installed vertically or at a slope in the ground by various techniques, to sufficient depth to achieve the necessary load bearing capacity through frictional resistance along their sides, end bearing resistance at their bases, or combinations of both.

5.12.1.2 Caissons

Caissons provide an alternative means to achieve adequate founding at intermediate to significant depths in both land and water environments. This system has been frequently as a practical means to found major bridges in deep water conditions.

Caissons provide a watertight space for underwater construction. The function of caissons is essentially the same as for piles, they transmit the applicable combination of permanent and transient loads applied at the top of the caisson through weak compressive soil or fill materials onto stiff or dense soil strata or rock at lower levels, in such a manner as to prevent excessive settlement, horizontal displacement or rotation of the supported structure at the caisson cap level.

Caissons for bridge foundations are usually cellular reinforced concrete structures, with circular, rectangular or more streamlined plan cross sections comprising one or more excavation compartments, and which are wholly or partly constructed at higher level and sunk in stages to the desired founding level. Sinking of Caisson usually occurs by internal excavation (bucket or crane excavation) sometimes assisted by the application of weights.

Small diameter concrete shafts comprising single open cells and constructed in the same manner as caissons are usually called cylinders. The distinction between cylinders and caissons is merely one of size. Because of their smaller size (usually up to about 8 foot diameter), cylinders lend themselves readily to precast concrete ring elements in their construction. This form of caisson construction can be very economical down to intermediate depths but are not well suited to sinking through ground containing large boulders or with high water tables. Cylinders constructed with precast concrete rings are usually filled with reinforced concrete.

5.12.2 Appropriate Applications

All construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving (impact and vibratory) takes place.

5.12.3 Limitations

Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

- Piles and Caissons are required to be founded at sufficient depth to prevent instability due to scour arising from major floods, when located in riverine environments.
- Specific permit requirements or mitigation measures such as 401 Water Quality Certification, U.S. Army Corps of Engineers Section 404 or Section 10 permits, U.S. Coast Guard Section 9 or General Bridge Act Permits and approval by USFWS and NMFS supersede the guidance in this BMP. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.

5.12.4 Standards and Specifications

- Use drip pans or absorbent pads during vehicle and equipment operation, maintenance, cleaning, fueling, and storage. Refer BMPs for Vehicle and Equipment Cleaning, Vehicle and Equipment Fueling, and Vehicle and Equipment Maintenance.
- Have spill kits and cleanup materials available at all locations of pile driving. Refer to BMP for Spill Prevention and Control.
- Equipment that is stored or in use in streambeds, or on docks, barges, or other structures over water bodies should be kept leak free.
- Park equipment over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads. The storage or use of equipment in streambeds or other bodies of water must comply with all applicable permits.
- Implement other BMPs as applicable, such as Dewatering Operations, Solid Waste Management, Hazardous Waste Management, and Liquid Waste Management.
- When not in use, store pile-driving equipment away from concentrated flows of stormwater, drainage courses, and inlets. Protect hammers and other hydraulic attachments from run-on and runoff by placing them on plywood and covering them with plastic when rain is forecast.
- Use less hazardous products, e.g., vegetable oil, when practicable.

5.12.5 Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect equipment every day at startup and repair equipment as needed (i.e., worn or damaged hoses, fittings, and gaskets). Recheck equipment at shift changes or at the end of the day and scheduled repairs as needed.
- Inspect entire pile driving areas and equipment for leaks and spills on a daily basis. Inspect equipment routinely for damage and repair equipment as needed.

5.13 Stream Diversion Techniques: Pumped, Pipe/Flume, and Excavated

5.13.1 Definition and Purpose

Stream diversions consists of a system of structures and measures that intercept an existing stream upstream of the project, transports it around the work area, and discharges it downstream. The selection of which stream diversion technique to use depends upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

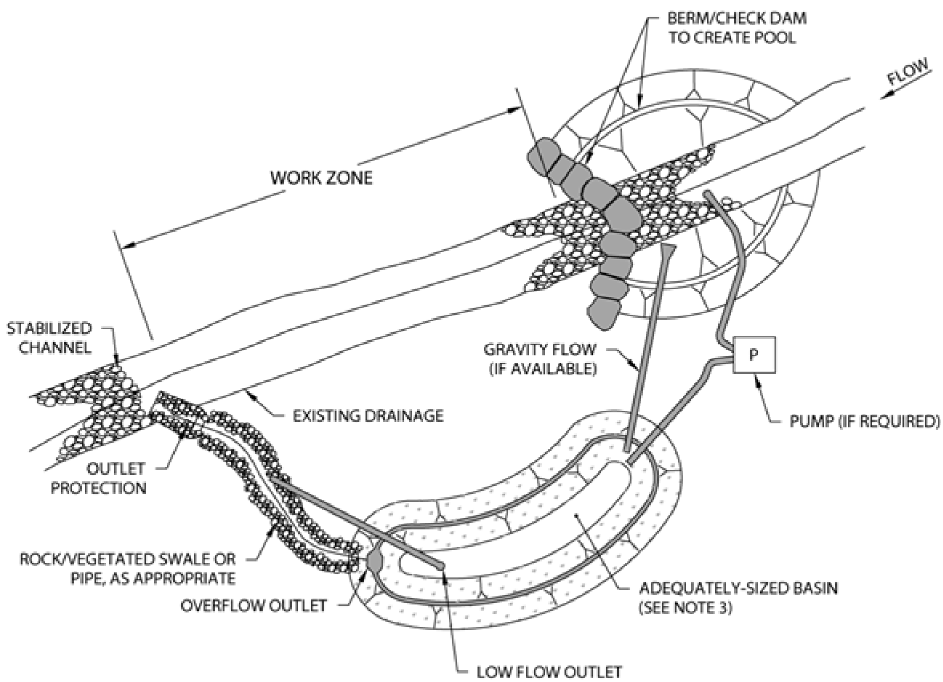


Figure 21: Diversion Method

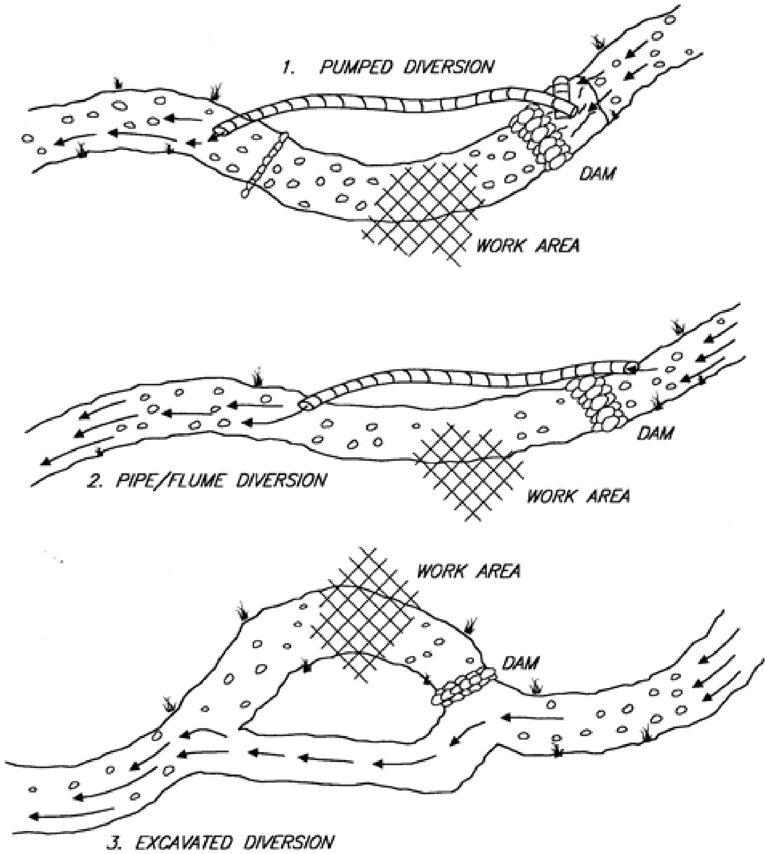


Figure 22: Diversion Methods.

5.13.2 Appropriate Applications

- Where Dewatering of the work area is necessary.
- Work areas that require isolation from flows.

5.13.3 Advantages

- Downstream sediment transport can be nearly eliminated.
- Pipes can be moved around to allow construction operation sequencing.
- The dams can also serve as temporary access to the site.
- Increased flows can be managed by adding more pumping capacity.
- Excavated channels isolate work from water flow and allow dewatering.
- Excavated channels can handle larger flows than pumps.

5.13.4 Limitations

- Flow volume is limited by pump capacity.
- A pumped diversion requires frequent monitoring of pumps.

- Large flows during storm events can overtop dams.
- Erosion at the outlet can occur.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment during installation and removal.
- Bypass channel or flume must be sized to handle flows, including possible floods.
- Channels must be protected from erosion.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.
- Flow volume is limited by temporary channel/flume capacity.
- Sudden rain could overtop excavated channels/flumes.
- Minor in-stream disturbance is required to install and remove dams to detour water into temporary channels/flumes.

5.13.5 STANDARDS AND SPECIFICATIONS

- Any type of water diversion requires special permitting.
- Water diversions are custom designed for unique site specific conditions. Contact system suppliers or design engineers for assistance.
- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Diversions should be sized to convey design flood flows.
- Pump capacity must be sufficient for design flow; the upper limit is approximately 0.3 m^3/sec (10 cfs) (the capacity of two 200 mm [8 inch] pumps).
- Adequate energy dissipation must be provided at the outlet to minimize erosion.
- Materials used to create dams upstream and downstream of the diversion should be erosion-resistant. Materials such as steel plates, sheet piles, sandbags, continuous berms, inflatable water bladders, etc., would be acceptable.
- Construction of a diversion channel should begin with excavation of the channel at the proposed downstream end, with work proceeding upstream. Once the watercourse to be diverted is reached, and the excavated channel is stable, the upstream end should be breached, and water should be allowed to flow down the new channel. Once flow has been established in the diversion channel, the diversion weir should be installed in the main channel; this will force all water to be diverted from the main channel.
- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Pump capacity must be sufficient for design flow.
- A standby pump is required in case a primary pump fails.

- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant; materials such as steel plate, sheet pile, sandbags, continuous berms, inflatable water bladders, etc., would be acceptable.
- When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached and the excavated channel is stable, breach the upstream end and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.

5.13.6 INSPECTION AND MAINTENANCE

- Conduct inspections as required by the NPDES permit or contract specifications.
- Pumped diversions require frequent monitoring of pumps.
- Monitor pumps, which may be required frequently for pumped diversions.
- Remove debris and repair linings and slope protection as required.
- The barrier should be inspected and any leaks, holes, gaps, scour or other problems should be addressed immediately.
- Upon completion of work, remove the diversion or isolation structure and redirect flow through the new culvert or back into the original stream channel. Recycle or re-use if applicable.
- Re-vegetate areas disturbed by BMP removal, if needed.
- Inspect embankments and diversion channels for damage to the linings, accumulating debris, sediment buildup, and adequacy of the slope protection. Remove debris and repair linings and slope protection as required. Remove holes, gaps, or scour.

5.14 In-stream Construction Sediment Control

5.14.1 Definition and Purpose

Instream sediment control BMPs are designed to provide sediment trapping for projects that must take place within the waterway. Projects that cross or otherwise work within the waterway shall strive to limit the amount of work that occurs within the water flow line. Measures that can reduce the amount of instream work include working from bank areas, diverting the stream around work areas, or scheduling for seasons of no or limited flows.

Instream sediment trapping devices include both floating materials (turbidity curtains described above) anchored to the watercourse bottom, instream sediment collection mats that run along the watercourse bottom and constructed sediment traps within a water coarse. These materials are specifically designed to limit sediment transport impacts within a body of water.

Coarse sediment traps are excavations in the bed or structures across a watercourse designed to limit the downstream movement of sand and gravel from upstream sediment sources. Depending on trap design and stream characteristics, lesser amounts of fine sediments (the fine sand, silts and clays that move in the flow rather than along the bed) can be trapped.

Sediment traps confine sediment deposition to a small reach of channel and reduce excavation costs: Sediment traps are relatively wide, short and deep excavations in the bed. Trapped sediment does not progress downstream where deposition would reduce channel capacity. The trap itself has to be episodically excavated (after major storms) rather than a much greater length of the stream.

5.14.2 Appropriate Applications

These devices provide sedimentation protection for instream, bank, or upslope ground disturbance, dredging, or filling within a waterway. There are three different options currently available for reducing turbidity while working in a stream or river. The stream can be; (1) isolated from the area in which work is occurring by means of a water barrier, (2) the stream can be diverted around the work site through a pipe or temporary channel, or (3) one can employ construction practices that minimize sediment suspension.

5.14.3 Limitations

Instream sediment traps are used in conjunction with other sediment control measures to reduce excessive sediment in watercourses: For upland sediment sources, the most desirable strategy is to implement land management practices that reduce erosion and transport of sediment and associated contaminants. The second strategy is to retain sediments on the land before they get to aquatic resources (e.g. filter strips, sediment retention ponds). For channel sources, streamflow should be retarded to protect the channel (e.g. vegetated banks); eroding banks should be repaired (e.g. contour and vegetate); and livestock that cause erosion should be removed from the channel and banks. If these measures are not undertaken, then continuous in-channel sediment problems will occur. In some cases, an in channel sediment trap can be the first line of defense (e.g. multiple, uncontrollable sediment sources).

5.14.4 STANDARDS AND SPECIFICATIONS

The highest hazard for sedimentation from in-stream construction generally occurs when the sediment control structure is being installed and when it is being removed. Generally the best time to install the stream isolation or diversion structure is when the stream is low. Conversely, the optimum time to remove in-stream diversion or isolation structures may be during the rising limb of a storm hydrograph aka the rapid increase in flow resulting from rainfall causing increased surface runoff and stream flow. A probable "worst time" to release high TSS into a stream system with diminishing aquatic habitat might be when the stream is very low; summer low flow, for example. During these times, the flow may be low while the biological activity in the stream is very high. On the other hand, the addition of short-term spike in TSS or sediment during a big storm discharge might have a relatively low impact on the aquatic habitat or turbidity because the stream is already turbid, and the stream energy is capable of transporting both suspended solids, and large quantities of bedload through the system.

- All embankments and structures must be constructed in accordance with accepted engineering practice, and with appropriate materials.
- Determine the design flow for the channel where the sediment trap is to be located and establish the viability of creating a trap (see location).
- Determine the target size of material to be trapped, and the trapping efficiency required. Fine sand (i.e. sediment ≥0.125 mm) and 90% trapping are often used.
- Determine the surface area of the sediment trap.
- Check the depth required to prevent re-suspension of the trapped sediment.
- These BMPs are designed and selected for specific flow conditions. For sites with flow velocities or currents greater than 5 feet per second, a qualified engineer and product manufacturer shall approve of the use.
- Instream sediment mats can be aligned either direction along the watercourse bottom, as long as the upstream mat overlaps the downstream mat (like a drainage ditch erosion control blanket installation). Ensure that the upstream edge is firmly trenched in to prevent flows from going under the mat. Mats shall cross the entire stream and be staked or use stones to keep them in place. Follow the manufacturer's specifications for the length of mat needed for the site's flow rate.

5.14.4.1 Techniques to minimize Total Suspended Solids

- **Padding -** Padding laid in the stream below the work site may trap some solids that are deposited in the stream during construction. After work is done, the padding is removed from the stream, and placed on the bank to assist in revegetation.
- **Clean, washed gravel -** Using clean, washed gravel as fill decreases solid suspension, as there are fewer small particles deposited in the stream.

- **Excavation using a large bucket -**Each time a bucket of soil is placed in the stream, a portion is suspended. Approximately the same amount is suspended whether a small amount of soil is placed in the stream, or a large amount. Therefore, using a large excavator bucket instead of a small one will reduce the total amount of soil that washes downstream.
- **Use of dozer for backfilling -** Using a dozer for backfilling instead of a backhoe follows the same principles – the fewer times soil is deposited in the stream, the less soil will be suspended.
- **Partial dewatering with a pump -** Partially dewatering a stream with a pump reduces the amount of water, and thus the amount of water that can suspend sediment

5.14.5 INSPECTION AND MAINTENANCE

- The design depth of the sediment trap should be marked in the sediment trap (e.g. a stage gauge board). Once the effective capacity of the sediment trap is reached, the trap effectiveness declines, and the sediment trap should be re-excavated.

5.15 Washing Fines (Streambed Restoration Technique)

5.15.1 Definition and Purpose

Washing fines is an "in-channel" sediment control method, which uses water, either from a water truck or hydrant, to wash any stream fines that were brought to the surface of the channel bed during restoration, back into the interstitial spaces of the gravel and cobbles. This technique is useful in both intermittent or ephemeral stream channels with gravelly to cobbely substrate and may be useful in perennial streams just prior to removing isolation structures.

The purpose of this technique is to reduce or eliminate the discharge of sediment from the channel bottom during the first seasonal flows, or "first flush." Sediment should not be allowed into stream channels; however, occasionally in-channel restoration work will involve moving or otherwise disturbing fines (sand and silt-sized particles) that are already in the stream, usually below bankfull discharge elevation. Subsequent re-watering (resumption of flows) of the channel can result in a plume of turbidity and sedimentation.

This technique washes the fines back into the channel bed. Bedload materials, including gravel cobbles, boulders and those fines, are naturally mobilized during higher storm flows. This technique is intended to delay the discharge until the fines would naturally be mobilized.

5.15.2 Appropriate Applications

- This technique should be used when construction work is required in channels. It is especially useful in intermittent or ephemeral streams in which work is performed "in the dry", and which subsequently become re-watered.

5.15.3 Limitations

- The stream must have sufficient gravel and cobble substrate composition.
- The use of this technique requires consideration of time of year and timing of expected stream flows.
- The optimum time for the use of this technique is in the fall, prior to winter flows.
- Consultation with, and approval from the Department of Fish and Game and the Regional Water Quality Control Board may be required.

5.15.4 Standards and Specifications

- Apply sufficient water to wash fines, but not cause further erosion or runoff.
- Apply water slowly and evenly to prevent runoff and erosion.
- Consult with appropriate Federal and State agencies (i.e. USACE, CWB-DOH, USFWS, NMFS and Department of Land and Natural Resources (DLNR)) for specific water quality requirements of applied water (e.g. chlorine)

CHAPTER 6:

6 GLOSSARY

Acute. Acute effects refer to physiological effects observed following limited duration exposure to contaminants.

Adsorption. Adsorption is the process by which dissolved pollutants adhere to suspended particulates, bottom sediments, vegetation surfaces, or other media (such as activated carbon). Some filtration media help remove charged pollutant particles, such as metal cations, by adsorption.

Aquatic or Riparian Problems: means construction or development sites where control practices are needed to protect aquatic or riparian environments or conditions (e.g., bank habitat, associated vegetative cover, preservation of habitat, life cycle impacts to plants and animals, water quality limitations that affect fish and wildlife).

Avulsion (avulsing). The rapid migration of the primary stream channel from its previous course, usually during flood events.

Backwater. The accumulation of water and slowing of flow behind (upstream of) an obstruction or constriction in a stream or floodplain.

Bank erosion. The carrying away or displacement of solids (sediment, soil, rock, and other particles) along a stream bank usually by the agents of streamflow or by downward or down-slope movement in response to gravity or by living organisms. Bank erosion is distinguished from weathering, which is the process of chemical or physical breakdown of the minerals in the rocks, although the two processes may be concurrent.

Bed load. The portion of the total sediment load of a river or stream that is in intermittent contact with the streambed.

Bedrock. The native, contiguous, consolidated rock underlying the surface of the Earth. Above bedrock is usually an area of broken and weathered unconsolidated rock, usually called sediment. Occasionally bedrock is exposed on the surface indicating that sediment has been removed by streamflow or some other sediment transport process (e.g., landsliding).

Best Management Practices (BMPs): means structural and non-structural methods, measures or practices implemented to prevent, reduce or mitigate adverse water quality impacts resulting from construction and operation of a project.

Better site design: includes a series of techniques that reduce impervious cover, conserve natural areas, and use pervious areas to more effectively treat stormwater runoff and promote the treatment train approach to runoff management.

Bioavailable. Able to interact with an organism in a physiologically meaningful (e.g., tissue uptake, bioaccumulation in tissue, metabolism) way.

Biochemical oxygen demand. A measure of the amount of oxygen needed by aquatic organisms to break down solids and other readily degradable organic matter present in water. Also called biological oxygen demand.

Biofiltration. The process of reducing pollutant concentrations in water by filtering the polluted water through biological materials, such as vegetation.

Bioinfiltration. The process of reducing pollutant concentrations in water by infiltrating the polluted water through grassy vegetation and soils into the ground. Biological oxygen demand. A measure of the quantity of oxygen used by microorganisms (e.g., aerobic bacteria) in the oxidation of organic matter. Frequently used as an indicator of water quality.

Bypass. An alternate flow path, such as an emergency overflow spillway, provided as part of a BMP. Designed to prevent facility failure when the primary mode of discharge is blocked.

Catch basin. A structure, typically concrete, that collects surface runoff through a metal grate. Catch basins typically include a sump where sediment can settle out.

Channel aggradation. The accumulation of sediment in a channel. It occurs when sediment supply exceeds the ability of a river to transport the sediment.

Channel incision. The deepening of the channel of a stream by erosion.

Channel migration. The movement of the horizontal position of a channel over time. Channel migration is often associated with the movement of a meander.

Chemical oxygen demand (COD). COD is a measure the amount of organic compounds in water. In natural surface waters, such as lakes and rivers, it indicates the presence of organic pollutants and is therefore a useful indicator of water quality. It is expressed in milligrams [of oxygen] per liter [of water, or other solution].

Chronic. Chronic effects refer to physiological effects observed following prolonged duration exposure to contaminants.

Colloidal. Remaining suspended without forming an ionic or dissolved solution.

Complexing. Bonding between a dissolved metal and another chemical (ligand) that keeps a dissolved metal in solution.

Composite sample. Composite samples involve a collection and mixing of multiple subsamples throughout a sampling period (usually an individual storm event) to provide water quality data that is more representative of the overall sampling period.

Contributing impervious area (CIA). All impervious surface within the project limits, plus impervious surface owned or operated by ODOT outside the project limits, that drains to the project via direct flow or discrete conveyance.

Cut bank. An erosional feature of streams. Cut banks are found in abundance along mature or meandering streams, they are located on the outside of a stream bend, known as a meander. They are shaped much like a small cliff, and are formed by the erosion of soil as the stream collides with the river bank. As opposed to a point bar, it is an area of erosion rather than deposition.

Detention. The temporary storage of stormwater runoff in a facility (typically a pond, vault, or large pipe) which is used to control the peak discharge rates. The entire stormwater volume is ultimately released, but at a lower discharge rate.

Dispersion. Release of surface water and stormwater runoff in such a way that the flow spreads over a wide area and is located so as not to allow flow to concentrate. Dispersion areas should be gently sloped, vegetated, and with underlying soils suitable for infiltration.

Dissolution. Dissolving a solid substance into a solvent to yield a solution.

Dissolved Metals. Metals bound to another chemical (ligand) through complexing that are in solution.

Dissolved Oxygen. The amount of oxygen dissolved in water. This term also refers to a measure of the amount of oxygen available for biochemical activity in a waterbody, an indicator of water quality.

Disturbed Soil Area: Disturbed soil areas (DSAs) are areas of exposed, erodible soil that are within the construction limits and that result from construction activities. The following are not considered DSAs:

> Areas where soil stabilization, erosion control, highway planting, or slope protection are applied and associated drainage facilities are in place and functional.
>
> Roadways, construction roads, access roads or contractor's yards that have been stabilized by the placement of compacted subbase or base material or paved surfacing.
>
> Areas where construction has been completed in conformance with the contract plans and permanent erosion control is in place and functional.

Durations. The cumulative amount of time that a receiving water experiences higher flows during and after storm events.

Effluent: The U.S. EPA defines effluent as wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall.

Emergency Overflow Spillway. An armored surface outlet from detention pond or other surface BMP to allow stormwater to discharge even in the event of outlet plugging or higher than design flows.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Erosion and sediment control (ESC) measures. Erosion control is the process of minimizing the amount of soil that runs off of a site (such as during construction). Sediment control is the process of retaining eroded soil on site, preventing damage to watercourses and infrastructure.

Eutrophication. A process whereby water bodies, such as lakes, estuaries, or slow-moving streams receive excess nutrients that stimulate excessive plant growth. Under eutrophic conditions, dissolved oxygen levels may be depleted by the respiring algae and by microorganisms that feed on dead algae, threatening salmon and other marine animals.

Evapotranspiration. The sum of evaporation (movement of water to the air through tree canopy interception, soil, and water bodies) and transpiration (water loss as vapor through plant activity).

Event Mean Concentration (EMC). Mean concentration of pollutants in runoff from a storm event.

Federal nexus. A project receiving federal funding (e.g., a highway construction project) is subject to federal laws and regulations. For example, ESA issues must be addressed either in a no-effect memorandum or in a BA.

Filter strip. A grassy area with gentle slopes that treats stormwater runoff from adjacent paved areas before it can concentrate into a discrete channel.

Filtration: Physical trapping of suspended pollutants. Filtration can encompass a wide range of physical and chemical mechanisms, depending on the filtering media, typically some sand media, natural soil, grassy vegetation, or mixes of chemically active ingredients such as perlite, zeolite, and granular activated carbon. Filtration removes particulate matter either on the surface of the filter or within the pore space of the filter. Filtration such as a sand filter can provide the added benefit of removing stormwater constituents that may be attached to solids such as metals and bacteria. Filtration can also provide opportunities for sorption processes to occur, reducing dissolved and fine suspended constituents. Filtration can often be an effective preliminary treatment for stormwater, by increasing the longevity of downstream BMPs and reducing maintenance frequency.

Floodplain. A floodplain is an area adjacent to a river or stream channel that is usually fairly flat and experiences occasional or periodic inundation during floods. The floodplain includes the floodway and other areas sometimes referred to as the flood fringe, which are inundated during floods but do not contribute significantly to flood flow conveyance and do not experience significant flow velocities.

Floodway. A floodway is an area that includes that channel of a river, stream, or other watercourse and adjacent lands that conveys floodwaters. The floodway is composed of the active river channel and those parts of the floodplain which experience flows of significant velocity and convey flow during flood events. The floodway concept has regulatory significance, imposing boundaries on developable area.

Flow concentration. The result of large flows in association with developed (impervious surface) areas, where infiltration is prevented. In these areas, flow becomes concentrated and channelized much more quickly than in undeveloped settings.

Flow regime. Generally referring to type of flow present in a stream. This has impacts on the position of hydraulic control in a stream. Fast moving, or supercritical flows, are controlled from upstream conditions; while slow moving, or subcritical flows, are controlled from downstream conditions.

Flow-through. Facilities such as grass swales that convey stormwater, or store it temporarily, prior to release through surface runoff or enclosed (piped) drainage systems. Flow-through facilities are in contrast to infiltration facilities.

Grab sample. A single sample of stormwater collected for analysis. Grab samples provide a snapshot of water quality conditions, and may be useful if collected during the rising limb or at the peak of a storm hydrograph when higher concentrations might be expected.

Gutter. A depressed concrete channel that conveys stormwater along the edge of a street.

Hardness. Water hardness measures the presence of multivalent cations dissolved in water; particularly calcium and magnesium divalent cations (ions with a charge of +2).

Headcut. An active eroding bank or channel that moves further upstream as it continues to erode material.

Hydraulic gradient. Difference in hydraulic head between two or more hydraulic head measurements divided by the length of the flow path.

Hydraulic head. Measure of water pressure above a datum. Typically expressed as an elevation, in feet.

Hydrologic attenuation: Hydrologic attenuation achieves pollutant reduction through runoff volume reduction. Infiltration is the primary means of hydrologic attenuation for the purposes of the types of BMPs used in stormwater management. Attenuation reduces the pollutant load discharged to surface waters, but does not necessarily reduce pollutant concentrations. Infiltration includes several different treatment mechanisms. Processes such as sorption, filtration, and microbial degradation occur as runoff infiltrates through the soil matrix.

Hydrologic soil groups. A soil characteristic classification system defined by the Natural Resources Conservation Service in which a soil may be categorized into one of four soil groups (A, B, C, or D) based on infiltration rate and other properties.

Impervious surface. A hard surface area that either prevents or slows the entry of water into the ground as compared with natural conditions (prior to development), and from which water runs off at an increased rate of flow or in increased volumes. Common impervious surfaces include but are not limited to rooftops, walkways, roads, and other concrete or asphalt surfaces.

Incised, incision. See channel incision.

Inert. Not chemically active. Inert filtration media would rely only on physical properties, rather than chemical treatment mechanisms such as sorption, for pollutant removal.

Infiltration rate. The rate, usually expressed in inches per hour, at which water moves downward (percolates) through the soil profile.

Infiltration. The downward movement of rainwater or surface water through the soil.

Inlet. A structure, typically concrete, that collects surface runoff through a metal grate. Inlets may include a sump where sediment can settle out.

Inundate. To cover with water, usually associated with flooding.

Jurisdictional wetland. A wetland that is connected to a Water of the United States (WOUS) using the Corps definition of WOUS (Section 404 Clean Water Act).

Large woody debris (LWD). The accumulation of trees and large branches that have fallen into a stream. LWD serves many purposes in a stream that are vital to life history of many native species of fish, plants and animals.

Levee. A natural or artificial slope or wall, usually earthen and often parallel to the course of a stream, to protect adjacent areas (usually development) from flooding.

Log jams. These features are large accumulations of large woody debris (LWD) in particular places along a stream bank or in the middle of a stream. Log jams have traditionally been removed from streams. However, increased awareness of these features has shown to provide key hydraulic and geomorphic function necessary for a healthy stream ecosystem.

Low Impact Development (LID): A comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. LID is a stormwater management design approach that attempts to mimic a site’s predevelopment hydrology by using design practices and techniques that reduce impervious areas, and preserve native vegetation and soils. LID stormwater management techniques capture, filter, store, evaporate and infiltrate runoff near its source.

Meander(ing). A bend in a stream, also known as an oxbow loop, or simply an oxbow. A stream of any volume may assume a meandering course, alternatively eroding sediments from the outside of a bend and depositing them on the inside. The result is a “snaking” pattern as the stream meanders back and forth across its down-valley axis.

Microbially mediated transformation: Microbial activity promotes or catalyzes redox reactions and transformations including degradation of organic and inorganic pollutants and immobilization of metals. Bacteria, algae, and fungi present in the soil or water column are primarily responsible for the transformations. Stormwater treatment that incorporates vegetation or permanent water pools usually has a diverse microbial population. These transformations can remove dissolved nitrogen species, metals, and simple and complex organic compounds. Soils may be inoculated with desirable microbes to promote specific reactions.

Municipal Separate Storm Sewer Systems: is defined as any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that is designed or used for collecting or conveying storm water.

Non-Point Source:

Nonstructural BMPs: include pollution prevention practices and source control activities, designed to minimize or eliminate a problem before it occurs. Source control BMPs are sometimes referred to as "good housekeeping" measures because a clean site will produce less pollutants than will a dirty one. Site planning and design of BMPs may, in and of itself, be considered a nonstructural BMP.

Outfall. Any location where concentrated stormwater runoff leaves the right if way as concentrated runoff. Outfalls may discharge to surface waters or groundwater.

Outlet protection. A protective barrier of rock, erosion control blankets, vegetation, or sod constructed at a conveyance outlet.

Overflow Spillway. See Emergency Overflow Spillway.

Particulates. A minute separate particle, such as a granular substance or powder.

Peak flow. Maximum discharge of stormwater associated with a particular design storm, e.g. 2-year, 24-hour design storm.

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Pipe cover. Vertical separation between pavement subgrade and the top of a pipe.

Planimeter. An instrument that measures the area of a plane figure as a mechanically coupled pointer traverses the perimeter of the figure.

Plug flow. A laminar flow regime where water flows as if in a full pipe, the unit that enters first, exits first and there is no mixing between different units of water, designing for this type of flow prevents “short circuiting”.

Point bar. A depositional feature of streams. Point bars are found in abundance in mature or meandering streams. They are crescent-shaped and located on the inside of a stream bend.

Pollutant load. Mass of a pollutant that a waterbody receives.

Polycyclic aromatic hydrocarbons (PAHs). PAHs are hydrocarbon compounds with multiple benzene rings. PAHs are typical components of asphalts, fuels, oils, and greases.

Pour point. The point at which smaller stream or river basins meet larger stream or river basins.

Pretreatment. The removal of material such as solids, grit, and grease from flows to improve treatability prior to biological or physical treatment processes; may include screening, settling, oil/water separation, or application of a basic treatment BMP prior to infiltration.

Primary Treatment Mechanisms:

Project Types: means general categories and types of construction or development projects (e.g., bridges, crossing structures, channel work, utility construction, site development, roads and highways, instream mining, dams and reservoirs, specialty activities such as go f courses and driveways) in Hawaii that are likely to require federal or state permits (e.g. 404 permit, 401 certification).

Point Source: A point source is any discrete conveyance such as a pipe or a man-made ditch.

Pollutant load: refer to the mass of pollutants, or the total amount delivered to the storm system or receiving waters independent of the volume of stormwater.

Rain Event: A qualifying rain event is any storm event that produces precipitation of ½ inch or more at the time of discharge. In conformance with the USEPA definition, a minimum of 72 hours of dry weather will be used to distinguish between separate qualifying rain events.

Reference Types: means categories that refer to structural or source controls, permanent best management practices, and specialty practices used by Federal, State or local agencies (e.g. National Park Service). Reference types are applicable to construction or development sites.

Release rate. The design peak discharge rate, typically expressed in cubic feet per second (cfs) from a detention facility. When detention is required, design standards often stipulate that post development release rates must match pre-pre-development peak discharge rates.

Riparian Area: Vegetated ecosystems along a waterbody through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent waterbody. These systems encompass wetlands, uplands, or some combination of these two land forms. They will not in all cases have all of the characteristics necessary for them to be classified as wetlands.

Runoff: Rainwater or snowmelt that directly leaves an area as surface drainage.

Salinity: The dissolved salts content of a body of water.

Sand filter: A manmade depression or basin with a layer of sand that treats stormwater as it percolates through the sand and is discharged via a central collector pipe.

Saturated hydraulic conductivity: The rate of movement of water through a saturated porous medium.

Sediment Problems: means construction or development sites where sediment and erosion controls are necessary to prevent sediment pollution (e.g., sediment deposits and loading, steep slopes, stream bank instability, runoff or velocity controls, wind erosion).

Sedimentation/density separation: Density separation refers to the unit processes of sedimentation and flotation that are dependent on the density differences between the pollutant and the water to effect removal. Sedimentation is the gravitational settling of particles having a density greater than water. Flotation is similar to gravitational sedimentation except in the opposite direction. Typically, floatable materials such as trash, debris, and hydrocarbons are removed through treatment processes that utilize the location of these pollutants on the water surface for removal. Stormwater treatment that incorporates vegetation and or permanent water bodies usually has a diverse microbial population, and it is not possible to optimize conditions for all beneficial species.

Sediment supply: The amount of sediment made available to a stream from the surrounding landscape and its runoff.

Sediment transport: The movement of solid particles ("sediments") due to the movement of the fluid in which they are immersed. In streams, the particles are rocks (sand, gravel, boulders, etc.) or clay, and the fluid is water.

Sheet flow: Runoff that flows over the ground surface as a thin, even layer, not concentrated in a channel.

Short Circuiting: the passage of runoff through a BMP in less than the design treatment time

Sorption: Sorption refers to the individual unit processes of both absorption and adsorption. Absorption is a physical process whereby a substance of one state is incorporated into another substance of a different state (e.g., liquids being absorbed by a solid or gases being absorbed by water). Adsorption is the physiochemical adherence or bonding of ions and molecules (ion exchange) onto the surface of another molecule. In stormwater treatment application, particularly for highway runoff, the primary pollutant types targeted with absorption unit processes are petroleum hydrocarbons, while adsorption processes typically target dissolved metals, nutrients, and organic toxicants such as pesticides and polycyclic aromatic hydrocarbons (PAHs). Different types of filter media may provide either or both of these unit processes.

Source Control BMP: Appropriate operational or structural measures that prevent or reduce pollutants from entering storm water. Examples of operational source control BMPs include good housekeeping practices, spill prevention, and employee training. Structural source control BMPs consist of enclosures or roofs for working areas where pollutants are present or installing devices that direct contaminated storm water to appropriate treatment BMPs.

Soil amendments. Materials that improve soil fertility for establishing vegetation or permeability for infiltrating runoff.

Soil texture. The proportion of sand, silt and clay in a soil. Many properties of soil are heavily dependent on texture including infiltration rate, resistance to erosion, and water-holding capacity.

Sorptive. A substance capable of taking up water or dissolved compounds.

Stormwater Management Plan. A document that describes the condition of receiving waters including water quality issues, channel conditions, watershed size and characteristics, and climate. It also describes the proposed drainage and stormwater management systems and estimates project impacts.

Stormwater treatment BMP. A BMP specifically designed for pollutant removal.

Swale. A wide natural channel with relatively gentle side slopes, generally with flow depths less than 1 foot, used to filter runoff.

Structural BMPs: are facilities constructed to passively treat runoff before it enters the receiving waters. Such BMPs (sometimes called "dirt moving" practices) used on a construction or development site can be either temporary or permanent, depending on the duration of their application, and are designed to reduce sediment pollution and other pollutants in runoff. Additionally, they can provide for the protection of aquatic or riparian areas. A limited number of special use practices requiring additional demonstration under the semi-arid or mountainous conditions in Hawaii are also listed in the matrix and can be used on a case-by-case basis. Special use practices have been developed for golf course projects, driveways and high-altitude construction. Some construction BMPs result in permanent sediment and erosion control structures, which are designed to work beyond the construction period.

Total Dissolved Solids: The dissolved matter found in water comprised of minerals salts and small amount of other inorganic and organic substances.

Total Kjeldahl Nitrogen: The sum of organic nitrogen and ammonia in a water body, measured in milligrams per liter (mg/L). High measurements typically result from sewage and manure discharges to water bodies.

Total Maximum Daily Load (TMDL): the maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under Clean Water Act section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Total Nitrogen: A measure of all forms of nitrogen (e.g., nitrate, nitrite, ammonia-N, and organic forms) that are found in a water sample.

Total Phosphorus: the total concentration of phosphorus found in the water. Phosphorus is a nutrient and acts as a fertilizer, increasing the growth of plant life such as algae.

Total Suspended Solids (TSS): solids suspended in water including a wide variety of material such as silt and decaying plant matter.

Toxicity. Adverse effects on living organisms resulting from chemical exposure.

Treatment train or system. The combination of several treatment facilities with unique unit processes applied in a linear progression (also called "in series").

Turbidity. The cloudiness or haziness of a fluid caused by individual particles (suspended solids)) that are generally invisible to the naked eye. The measurement of turbidity is a key test of water quality.

Underdrain. Plastic pipes with holes drilled through the top, installed on the bottom of an infiltration facility, that are used to collect and remove excess runoff.

Qualifying Rain Event: Any rain event producing precipitation of 0.5 inch or more over the duration of the rain event.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Ordinary High Water Mark: that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Unit Operations. The treatment facilities in which the unit process occurs (i.e., wet pond or swale).

Unit Process. The specific mechanism of pollutant removal (i.e., sedimentation or vegetative uptake).

Vegetated filter strip. A facility designed to provide stormwater treatment of conventional pollutants (but not nutrients) through the process of biofiltration.

Vegetative (or Biological) Uptake. The processes by which nutrients and other dissolved chemicals are taken up by plants and algae. Chemicals may be metabolized or stored in plant tissues.

Uptake/Storage: Uptake and storage refer to the removal of organic and inorganic constituents by plants and microbes through nutrient uptake and bioaccumulation. Nutrient uptake converts required micro- and macro-nutrients into living tissue. In addition to nutrients, various algae and wetland and terrestrial plants accumulate organic and inorganic constituents in excess of their immediate needs (bioaccumulation). The ability of plants to accumulate and store metals varies greatly. Significant metal uptake by plants will not occur unless the appropriate species are selected.

Watershed. A geographic region within which water drains into a particular river, stream, or body of water.

Wetlands: are a subset of jurisdictional WUS and are jointly defined by the USACE and the U.S. Environmental Protection Agency (40 Code of Federal Regulations [CFR] 230.3) as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

APPENDIX A: CONSTRUCTION BEST MANAGEMENT PRACTICES FIELD MANUAL

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APPENDIX B: STORM WATER PERMANENT BEST MANAGEMENT PRACTICES MANUAL

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APPENDIX C: DEVELOPING YOUR STORMWATER POLLUTION PREVENTION PLAN; A GUIDE FOR CONSTRUCTION SITES

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Appendix D: Hawaii NPDES General Permit Authorizing Discharges of Storm Water Associated with Construction Activity and Department of Health Standards NPDES Permit Conditions

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APPENDIX E: FHWA-CFLHD STANDARD DETAILS

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APPENDIX F: RAIN EVENT ACTION PLAN FORM

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APPENDIX G: IN-WATER POLLUTION PREVENTION PLAN SAMPLE

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Attachment D

NMFS Best Management Practices (BMP) for General In-Water Work Including Boat and Driver Operations (October 2018)

Best Management Practices (BMP) for General In-Water Work Including Boat and Diver Operations

October 2018

NMFS Protected Resources Division recommends implementation of the following BMPs to reduce potential adverse effects on protected marine species. These BMPs are not intended to supplant measures required by any other agency.

All workers associated with this project, irrespective of their employment arrangement or affiliation (e.g. employee, contractor, etc.) should be fully briefed on required BMP and the requirement to adhere to them for the duration of their involvement in this project.

A. Constant vigilance shall be kept for the presence of ESA-listed marine species during all aspects of the proposed action, particularly in-water activities such as boat operations, diving, and deployment of anchors and mooring lines.

1. The project manager shall designate an appropriate number of competent trained observers to survey the areas adjacent to the proposed action for ESA-listed marine species.
2. Surveys shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one half hour. Periodic additional surveys throughout the work day are strongly recommended.
    a. Special attention will be given to verify that no ESA-listed species are in the area where equipment or material is expected to enter the water. This includes anchoring in sandy areas well away from hard substrate or live coral.
    b. Some unusual activities may require additional surveys as advised by NMFS on an *ad hoc* basis as identified during the consultation.
3. All work shall be postponed or halted when ESA-listed marine species are within 50 yards of the proposed work, and shall only begin/resume after the animals have voluntarily departed the area.
    a. If ESA-listed marine species are noticed within 50 yards after work has already begun, that work may continue only if, there is no way for the activity to adversely affect the animal(s). For example; divers performing surveys or underwater work would likely be permissible, whereas operation of heavy equipment is likely not.
4. Before entering the water, all divers shall be made aware of corals, and the requirement to avoid contact with those organisms while performing their duties. This shall include taking measures to avoid kicking the reef with fins, and to secure dive and survey equipment in a manner that will prevent that material from being drug across the substrate.
5. All objects will be lowered to the bottom (or installed) in a controlled manner. This can include the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.
6. In-water tethers, as well as mooring lines for vessels and marker buoys shall be kept to the minimum lengths necessary, and shall remain deployed only as long as needed to properly accomplish the required task.

7. When piloting vessels, vessel operators shall alter course to remain at least 50 yards from marine mammals and sea turtles.
8. Reduce vessel speed to 10 knots or less when piloting vessels at or within the ranges described above from marine mammals and sea turtles. Operators shall be particularly vigilant to watch for turtles at or near the surface, and if practicable, reduce vessel speed to 5 knots or less.
9. If despite efforts to maintain the distances and speeds described above, a marine mammal or turtle approaches the vessel, put the engine in neutral until the animal is at least 50 feet away, and then slowly move away to the prescribed distance.
10. Marine mammals and sea turtles shall not be encircled or trapped between multiple vessels or between vessels and the shore.
11. Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA-listed marine species.
    - Report any monk seal sightings:
    - Email us at pifsc.monksealsighting@noaa.gov or
    - Call your island's Marine Mammal Response Coordinator:
        - Island of Hawaii: (808) 987-0765
        - Kauai: (808) 651-7668
        - Maui/Lanai: (808) 292-2372
        - Molokai: (808) 553-5555
        - Oahu: (808) 220-7802

B. No contamination of the marine environment shall result from project-related activities.

1. A contingency plan to control toxic materials is required.
2. Appropriate materials to contain and clean potential spills shall be stored at the work site, and be readily available.
3. Heavy equipment in and near water bodies should consider use of bio-fuels and non-petroleum based hydraulic fluids.
4. All project-related materials and equipment placed in the water shall be free of pollutants.
5. The project manager and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected, and shall not proceed until the leak is repaired and equipment cleaned.
6. Fueling of land-based vehicles and equipment shall take place at least 50 feet away from the water, preferably over an impervious surface. Fueling of vessels shall be done at approved fueling facilities.
7. Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.
8. A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project.

C. Minimize anchor impact to corals, seagrass or other Essential Fish Habitat

1. Use designated anchorage area when available.
2. Divers will assist the deployment and setting of the anchor, when practicable.
3. Avoid anchoring in coral and seagrass.
4. Minimize anchor drag by periodic visual observation to monitor dragging and to identify if proper tension is being maintained on the line and monitor ocean conditions that might affect the anchor's functionality.

Attachment E

Consultation and Environmental Entitlements Obtained Previously

Attachment 1	**Senate Bill 1016 SD1 HD1 – Exemption**
Attachment 2	**CZM Federal Consistency Review Determination (November 10, 2008)**
Attachment 3	**Stream Channel Alteration Permit Approval (February 18, 2009, provided for reference – no longer required per SB 3010)**
Attachment 4	**Section 4(f) Coastal Zone Management**
Attachment 5	**Endangered Species Act Section 7**
Attachment 6	**Rivers and Harbors Act Section 9**
Attachment 7	**National Historic Preservation Act Section 106**
Attachment 8	**Special Management Area Approval (Resolution 278-CD1)**
Attachment 9	**Categorical Exclusion Approval**

Attachment 1

Senate Bill 1016 SD1 HD1 – Exemption

THE SENATE
TWENTY-NINTH LEGISLATURE, 2017
STATE OF HAWAII

S.B. NO. 1016 S.D. 1 H.D. 1

A BILL FOR AN ACT

RELATING TO TRANSPORTATION.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. Act 218, Session Laws of Hawaii 2012, is amended by amending section 2 to read as follows:

"SECTION 2. Beginning July 1, 2012, and ending June 30, [~~2017,~~] 2022, the department of transportation and any of its contractors shall be exempt from state requirements under the following, but only to the extent necessary to expedite the projects enumerated under section 3 of this Act:

(1) Chapter 6E, Hawaii Revised Statutes, historic preservation;

(2) Part II of chapter 171, Hawaii Revised Statutes, public lands;

(3) Chapter 174C, Hawaii Revised Statutes, state water code;

(4) Chapter 180, Hawaii Revised Statutes, soil and water conservation districts;

(5) Chapter 180C, Hawaii Revised Statutes, soil erosion and sediment control;

(6) Chapter 183, Hawaii Revised Statutes, forest reserves, water development, and zoning;

(7) Chapter 183D, Hawaii Revised Statutes, wildlife;

(8) Chapter 184, Hawaii Revised Statutes, state parks and recreation areas;

(9) Chapter 195, Hawaii Revised Statutes, natural area reserves system;

(10) Chapter 195D, Hawaii Revised Statutes, conservation of aquatic life, wildlife, and land plants;

(11) Chapter 198D, Hawaii Revised Statutes, Hawaii statewide trail and access system;

(12) Chapter 205, Hawaii Revised Statutes, land use commission;

(13) Chapter 205A, Hawaii Revised Statutes, coastal zone management;

(14) Chapter 341, Hawaii Revised Statutes, environmental quality control;

(15) Chapter 342B, Hawaii Revised Statutes, air pollution;

(16) Chapter 342D, Hawaii Revised Statutes, water pollution;

(17) Chapter 342E, Hawaii Revised Statutes, nonpoint source pollution management and control;

(18) Chapter 342F, Hawaii Revised Statutes, noise pollution;

(19) Chapter 343, Hawaii Revised Statutes, environmental impact statements; and

(20) Chapter 344, Hawaii Revised Statutes, state environmental policy."

SECTION 2. Act 218, Session Laws of Hawaii 2012, is amended by amending section 4 to read as follows:

"SECTION 4. If the construction of a project granted an exemption under this Act is not completed by June 30, [~~2017,~~] 2022, the governor may authorize in writing before that date the continuation of construction of the project until completion. If so authorized, the project shall continue to be exempt as provided under this Act."

SECTION 3. Statutory material to be repealed is bracketed and stricken. New statutory material is underscored.

SECTION 4. This Act shall take effect on July 1, 2030.

S.B. NO. 1016 S.D. 1 H.D. 1

Report Title:
Transportation; Bridges; Exemptions

Description:
Temporarily exempts the Department of Transportation and its contractors from certain state requirements for certain bridge rehabilitation projects by extending the end date to June 30, 2022. (SB1016 HD1)

The summary description of legislation appearing on this page is for informational purposes only and is not legislation or evidence of legislative intent.

Attachment 2

CZM Federal Consistency Review Determination (November 10, 2008)

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
ABBEY SETH MAYER
DIRECTOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
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Ref. No. P-12315

November 10, 2008

To: Brennon T. Morioka, Ph.D., Director
Department of Transportation

Attention: Glenn M. Yasui, Administrator
Highways Division

From: Abbey Seth Mayer, Director MK Kobayashi for

Subject: Hawaii Coastal Zone Management (CZM) Program Federal Consistency Review for Federal Highway Administration (FHWA) Funding for Kaipapau Stream Bridge Replacement, Hauula, Oahu; Federal Aid Project No. BR-083-1(48)

The proposal to use FHWA funding to construct a replacement bridge for Kaipapau Stream Bridge has been reviewed for consistency with the Hawaii CZM Program. We concur with your CZM consistency certification based on the following conditions:

1. The project shall comply with applicable requirements of the State Water Code, Hawaii Revised Statutes (HRS), Chapter 174C, including obtaining a Steam Channel Alteration Permit which is administered by the Commission on Water Resource Management and is a federally-approved enforceable policy of the Hawaii CZM Program.

2. The project shall comply with State of Hawaii water quality standards and requirements, including obtaining a Section 401 Water Quality Certification and NPDES Permit, as specified in Hawaii Administrative Rules, Chapter 11-54 and 11-55, and HRS, Chapter 342D. These authorities are administered by the Department of Health and are federally-approved enforceable policies of the Hawaii CZM Program.

3. The project shall comply with the State Historic Preservation Division (SHPD) requirements of the Section 106 consultation and HRS, Chapter 6E - Historic Preservation, which is a federally-approved enforceable policy of the Hawaii CZM Program. According to the CZM consistency assessment, an archaeological monitoring plan will be developed and submitted to SHPD for review and approval. SHPD has previously determined that the project design will have "no adverse effect"

on historic resources, provided that photographic documentation of the existing bridge is completed prior to demolition.

4. According to the CZM consistency assessment, the project will require a special management area use permit from the City and County of Honolulu, Department of Planning and Permitting. HRS, Chapter 205A - Coastal Zone Management, which includes the special management area provisions, is a federally-approved enforceable policy of the Hawaii CZM Program.

5. This CZM consistency concurrence is only applicable for the use of FHWA funds. Federal permits such as the Department of the Army Permit will require a separate CZM federal consistency review.

CZM consistency concurrence is not an endorsement of the project nor does it convey approval with any other regulations administered by any State or County agency. Thank you for your cooperation in complying with Hawaii's CZM Program. If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

c: √Mr. Chester Koga, R.M. Towill Corporation
U.S. Army Corps of Engineers, Regulatory Branch
Department of Health, Clean Water Branch
Department of Land and Natural Resources,
Commission on Water Resource Management
Historic Preservation Division
Department of Planning and Permitting, City and County of Honolulu

Attachment 3

Stream Channel Alteration Permit (SCAP) Approval
(February 18, 2009, provided for reference – no longer required per SB 3010)

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI
JIRO A. SUMADA

IN REPLY REFER TO:

HWY-DD 2.1426

APR 24 2009

TO: THE HONORABLE LAURA H. THIELEN, CHAIRPERSON
DEPARTMENT OF LAND AND NATURAL RESOURCES

FROM: BRENNON T. MORIOKA Ph.D., P.E.
DIRECTOR OF TRANSPORTATION

SUBJECT: KAMEHAMEHA HIGHWAY, KAIPAPA'U STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48), APPLICATION APPROVAL FOR STREAM CHANNEL ALTERATION PERMIT (SCAP.2034.3)

Thank you for your approval for SCAP.2034.3 on February 18, 2009 as stated in your letter on February 24, 2009. Attached is your copy of the signed accepted SCAP. 2034.3 permit.

If you have any questions or require additional information regarding this request, please contact Li Nah Okita at 692-7581 or Duane Taniguchi at 692-7582 of our Design Section, Design Branch, Highways Division, and reference HWY-DD 2.1426 as noted above.

Attachment

c: R.M. Towill Corporation (Mr. Walter Chong)

SCAP.2034.3
Stream Channel Alteration Permit

PETITIONER:	**State Department of Transportation, Highway Division**
STREAM:	**Kaipapau Stream, Hauula, Oahu**
TMKs:	**(1) 5-4-011:004-0001 and 0002, 5-4-011:021, 5-4-018:001, 002 and 003**

STREAM CHANNEL ALTERATION PERMIT

The permittee is hereby granted a permit to alter a stream channel, in accordance with the specifications and plans contained in the application, subject to the following conditions and limitations:

1. The permit application and staff submittal approved by the Commission at its meeting on February 18, 2009, shall be incorporated herein by reference.
2. The permittee shall comply with all other applicable statutes, ordinances, and regulations of the Federal, State, and City and County of Honolulu governments.
3. The permittee shall be liable, to the extent allowed by the Federal Tort Claims Act, for claims for personal injuries or property damage resulting from the negligent or wrongful act or omission of any employee of the United States while acting within the scope of his or her employment, arising out of this agreement.
4. The permittee shall notify the Commission, by letter, of the actual dates of project initiation and completion. The permittee shall submit a set of as-built plans and photos of the completed work to the Commission upon completion of this project. This permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The proposed work under this stream channel alteration permit shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Commission upon showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Commission no later than three (3) months prior to the date the permit expires. If the commencement or completion date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.
5. Before proceeding with any work authorized by the Commission, the permittee shall submit one set of construction plans and specifications to determine consistency with the conditions of the permit and the declarations set forth in the permit application.
6. *The permittee shall develop site-specific, construction best management practices (BMPs) that are designed, implemented, operated, and maintained by the permittee and its contractor to properly isolate and confine construction activities and to contain and prevent any potential pollutant(s) discharges from adversely impacting state waters. BMPs shall control erosion and dust during construction and schedule construction activities during periods of low stream flow.*
7. *The permittee shall protect and preserve the natural character of the stream bank and stream bed to the greatest extent possible. The permittee shall plant or cover lands denuded of vegetation as quickly as possible to prevent erosion and use native plant species common to riparian environments to improve the habitat quality of the stream environment.*
8. In the event that subsurface cultural remains such as artifacts, burials or deposits of shells or charcoal are encountered during excavation work, the permittee shall stop work in the area of the find and contact the Department's Historic Preservation Division immediately. Work may commence only after written concurrence by the State Historic Preservation Division.

Ken C. Kawahara

DATE OF APPROVAL:	**February 18, 2009**	for LAURA H. THIELEN, Chairperson
EXPIRATION DATE:	**February 18, 2011**	Commission on Water Resource Management

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed. I also understand that non-compliance with any permit condition may be grounds for revocation and fines up to $5,000 per day starting from the permit date of approval.

ACCEPTED:

Glenn M. Yasui

GLENN M. YASUI, State Department of Transportation, Highway Division

Date: 3-5-09

Please sign both copies of this permit, return one copy to the Chairperson, and retain the other copy for your records.

HWY 834

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON

MEREDITH J. CHING
JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
DONNA FAY K. KIYOSAKI, P.E.
LAWRENCE H. MIIKE, M.D., J.D.

KEN C. KAWAHARA, P.E.
DEPUTY DIRECTOR

DEPT OF TRANSPORTATION

2009 FEB 27 A 10: 04

HIGHWAYS DIVISION

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

February 24, 2009

Ref.: SCAP.2034.3

TO: Mr. Glenn M. Yasui, Highways Administrator
State Department of Transportation

FROM: for Laura H. Thielen, Chairperson
Commission on Water Resource Management

Ken C. Kawahara

SUBJECT: Application for Stream Channel Alteration Permit (SCAP.2034.3)
DOT Bridge Replacement across Kaipapau Stream, Hauula, Oahu,
TMKs: (1) 5-4-011:004-0001 and 0002, 5-4-011:021, 5-4-018:001, 002 and 003

On February 18, 2009, the Commission on Water Resource Management (Commission) approved your application for a Stream Channel Alteration Permit (SCAP.2034.3) for DOT's bridge replacement across Kaipapau Stream in Hauula, Oahu, at TMKs: (1) 5-4-011:004-0001 and 0002, 5-4-011:021, 5-4-018:001, 002 and 003. The February 18, 2009, staff submittal, Item C-1, is enclosed for your information.

Please review the conditions of the approval for SCAP.2034.3. If they are acceptable to you, please sign both copies of the permit, return one copy to the Commission, and retain a copy for your records. Also enclosed are forms to notify the Commission of the start and completion of construction work. Please complete and submit these forms to our office within seven days of the start and completion of construction activities.

If you have any questions concerning this permit, please contact Robert Chong in the Stream Protection and Management Branch at 587-0266.

Enclosures

RECEIVED
09 MAR -2 A10:45
DESIGN BRANCH
HIGHWAYS DIVISION
DEPT. OF TRANSPORTATION

Attachment 4

Section 4(f) Coastal Zone Management

Glenn
HWY 1030

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
LAURA H. THIELEN
DIRECTOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-11293

March 13, 2006

RECEIVED
MAR 15 2006

'06 MAR 21 P4 :
DEPT. OF TRANSPORTATION

To: Brennon T. Morioka
Deputy Director - Highways
Department of Transportation

From: Laura H. Thielen, Director

Subject: Kamehameha Highway, Kaipapau Stream Bridge Replacement, Hauula, Oahu; Federal-Aid Project No. BR-083-1(48) Section 4(F) Consultation Notification, Department of Transportation Act of 1966

Replacing the Kaipapau Stream Bridge on Kamehameha Highway in Hauula, Oahu, will likely require a Coastal Zone Management (CZM) federal consistency review by the Hawaii CZM Program. CZM federal consistency reviews are required for the use of certain Federal funds such as Federal Highway Administration grants, and for Federal permits such as the Department of the Army (DA) Permit from the U.S. Army Corps of Engineers. If the project involves either one or both of these Federal actions, then CZM federal consistency review will be necessary. It is possible that the project will require two CZM federal consistency reviews, one for the Federal funding and another for the DA Permit.

If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

c: U.S. Army Corps of Engineers, Regulatory Branch
Department of Planning and Permitting, City and County of Honolulu

HWY 1026

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
MAR 21 2006
LO/DT
DEPARTMENT OF TRANSPORTATION
HIGHWAY-DD

DEPT OF TRANSPORTATION
2006 MAR 13 P 1:52
HIGHWAYS DIVISION

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EMD / CWB

03036CEC.06

March 8, 2006

RECEIVED
2006 MAR 15 P 3:12
HIGHWAYS DIVISION
OAHU DISTRICT

Mr. Glenn M. Yasui
Administrator
Highways Division
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Yasui:

Subject: Kamehameha Highway, Kaipapau Stream Bridge Replacement Federal-Aid Project No. BR-083-1(48) Section 4(F) Consultation Notification Department of Transportation Act of 1966 (United States Code - 49 U.S.C. 303)

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of the subject document on March 3, 2006. The CWB has reviewed the limited information contained in the subject document and offers the following comments:

1. The Army Corps of Engineers should be contacted at (808) 438-9258 for this project. Pursuant to Federal Water Pollution Control Act (commonly known as the "Clean Water Act" (CWA)), Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40, Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

2. In accordance with HAR, Sections 11-55-04 and 11-55-34.05, the Director of Health may require the submittal of an individual permit application or a Notice of Intent (NOI) for general permit coverage authorized under the National Pollutant Discharge Elimination System (NPDES).

   a. An application for an NPDES individual permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

b. An NOI to be covered by an NPDES general permit is to be submitted at least 30 days before the commencement of the respective activity. A separate NOI is needed for coverage under each NPDES general permit. The NOI forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html.

i. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi). [HAR, Chapter 11-55, Appendix B]

ii. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the commencement of the construction activities.** [HAR, Chapter 11-55, Appendix C]

iii. Discharges of treated effluent from leaking underground storage tank remedial activities. [HAR, Chapter 11-55, Appendix D]

iv. Discharges of once through cooling water less than one (1) million gallons per day. [HAR, Chapter 11-55, Appendix E]

v. Discharges of hydrotesting water. [HAR, Chapter 11-55, Appendix F]

vi. Discharges of construction dewatering effluent. [HAR, Chapter 11-55, Appendix G]

vii. Discharges of treated effluent from petroleum bulk stations and terminals. [HAR, Chapter 11-55, Appendix H]

viii. Discharges of treated effluent from well drilling activities. [HAR, Chapter 11-55, Appendix I]

ix. Discharges of treated effluent from recycled water distribution systems. [HAR, Chapter 11-55, Appendix J]

x. Discharges of storm water from a small municipal separate storm sewer system. [HAR, Chapter 11-55, Appendix K]

xi. Discharges of circulation water from decorative ponds or tanks. [HAR, Chapter 11-55, Appendix L]

3. In accordance with HAR, Section 11-55-38, the applicant for an NPDES permit is required to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD. If applicable, please submit a copy of the request for review by SHPD or SHPD's determination letter for the project.

4. Any discharges related to project construction or operation activities, with or without a Section 401 WQC or NPDES permit coverage, shall comply with the applicable State Water Quality Standards as specified in HAR, Chapter 11-54.

Hawaii Revised Statutes, Subsection 342D-50(a), requires that "[n]o person, including any public body, shall discharge any water pollutants into state waters, or cause or allow any water pollutant to enter state waters except in compliance with this chapter, rules adopted pursuant to this chapter, or a permit or variance issued by the director."

If you have any questions, please contact Mr. Alec Wong, Supervisor of the Engineering Section, CWB, at 586-4309.

Sincerely,

Denis R Lau

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

EC:np

c: Regulatory Branch, COE
CZM Program, Office of Planning, DBEDT
CWRM, DLNR

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 973-2937 • Fax: (808) 973-2941

RECEIVED
APR 18 2006
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DEPARTMENT OF TRANSPORTATION
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HWY 1054

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MAR 31 2006

DESIGN BRANCH
HIGHWAYS DIVISION
DEPT. OF TRANSPORTATION

Brennon T. Morioka
Deputy Director-Highways
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Subject: Kamehameha Highway, Kaipapau Street Bridge Replacement, Federal-Aid Project No. BR-083-1(48) Section 4(f) Consultation Notification, Department of Transportation Act of 1966 (United States Code – 49 U.S.C.303.)

Dear Mr. Morioka:

I would like to thank you for the opportunity to comment on your letter regarding the Kaipapau Stream Bridge Replacement project.

As per our conversation on March 9, 2006, I wanted to bring to your attention that the project appears to take place near a beach with a known Hawaiian monk seal haul-out zone. Hawaiian monk seals are protected under the Marine Mammal Protection Act and the Endangered Species Act. As we discussed, it wasn't clear from the materials forwarded whether or not impacts or effects of the planned project could affect the beach area. As a result of our expression of concern and inquiry, you indicated you would seek additional information on proximity of activity to the beach and potential impacts of the project on the beach area, particularly as regards potential monk seal haul out disruption.

Again, the National Marine Fisheries Service appreciates the opportunity to offer comments on the proposed project. Please feel free to contact my office if you need additional information prior to undertaking the project.

Sincerely,

Marilyn F. Luipold
NEPA Coordinator

cc: Protected Resources Division
cc: Habitat Conservation Division

Attachment 5

Endangered Species Act Section 7 Consultation

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
APR 30 2007
DEPARTMENT OF TRANSPORTATION
HIGHWAY-DD

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

DEPT OF TRANSPORTATION
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HIGHWAYS DIVISION

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ROBERT K. MASUDA
DEPUTY DIRECTOR FOR LAND

DEPUTY DIRECTOR FOR
THE COMMISSION ON
WATER RESOURCE MANAGEMENT

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

April 18, 2007

'07 APR 27 A10 :27
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DESIGN BRANCH
HIGHWAYS DIVISION
DEPT. OF TRANSPORTATION

Mr. Brennon T. Morioka, Ph.D., P.E.
Deputy Director-Highways
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Morioka:

Subject: Endangered Species Act Section 7 Interagency Consultation Kamehameha Highway, Kaipapau Stream Bridge Replacement Federal-aid Project No. BR-083-1(48), Hwy-DD 2.4072.

We appreciate the opportunity to comment on your project. DLNR, Division of Forestry and Wildlife have no comments to offer. Since the location of the subject project is away from DOFAW management areas, there will be no impacts to our programs. Your attached vegetation and biological studies show no endangered plants near this replacement bridge over Kaipapau stream along Kamehameha Highway. Thank you for allowing us to review your project.

Sincerely yours,

Paul J Conry

Paul J. Conry
Administrator

HWY 337

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

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2007 MAY 23 A 10:48
HIGHWAYS DIVISION

MAY 17 2007

Mr. Brennon T. Morioka, Ph. D., P.E.
Deputy Director-Highways
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Morioka:

This letter responds to your April 11, 2007 letter, received by our office on April 17, 2007, regarding the State of Hawaii Department of Transportation's (HDOT) proposal to replace the Kaipapau Stream Bridge along with improved roadway shoulders, reinforced guardrails, and drainage features. Your letter requested information on listed species and their critical habitats as well as proposed and candidate species and critical habitat for listing that may occur within the potential area of discharge. The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) Pacific Islands Regional Office Protected Resources Division provides ESA-listed marine protected species information under our statutory authorities under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 *et seq.*).

Your letter stated that the purpose of this project is to fulfill HDOT's mandate to maintain the functional and structural integrity of bridges on State roadways. The Kaipapau Stream Bridge, located on Kamehameha Highway, State Route 83 in Hauula, Oahu, was inspected and found to be structurally deficient and thus in need of repairs. On October 1, 2004, a "Water quality and biological reconnaissance surveys of lower Kaipapau Stream near Hauula, Oahu" was prepared and later provided to NMFS staff for review. In early March 2006 you contacted NMFS staff regarding potential impacts to ESA-listed species and NMFS staff responded with comments on March 31, 2006. On May 2, 2006, you contacted Mr. David Schofield, the Marine Mammal Response Coordinator for NMFS Protected Resources Division. As originally stated by Mr. Schofield, Hawaiian monk seals are known to haul out in the general vicinity of the project area, which could include the mouth of Kaipapau Stream; however, it is unlikely that the species will travel 350 feet up the stream to the proposed project site.

To reiterate, based on the maps provided in your most recent correspondence, ESA-listed species under our jurisdiction that may occur in waters or shorelines around the project area include the endangered Hawaiian monk seal (*Monachus schauinslandi*). No additional marine species are proposed nor are candidates for listing at this time, and no critical habitat has been designated or proposed for any marine protected species around Oahu, Hawaii. A complete list of Hawaii's marine protected species under NMFS's jurisdiction is also enclosed for your review.

As you stated in your letter dated May 17, 2006, Mr. Schofield offered to visit the construction site and provide a protected wildlife briefing to the construction crew. As this offer is still valid, NMFS is pleased that you will advise the project contractor to contact our office to coordinate a briefing between Mr. Schofield and the construction crew.

Thank you for working with NMFS to protect our nation's living marine resources. Should you have any other questions regarding this project or the consultation process, please contact Krista Graham on my staff at (808) 944-2238, or at the e-mail address Krista.Graham@noaa.gov. Please refer to consultation #: I-PI-07-592-CY.

Sincerely,

Chris E. Yates
Assistant Regional Administrator
For Protected Resources

HAWAII MARINE PROTECTED SPECIES

National Marine Fisheries Service, Pacific Islands Regional Office

MARINE MAMMALS

All marine mammals are protected under the Marine Mammal Protection Act. Those in *ITALICIZED CAPITALS* are also listed as endangered under the Endangered Species Act.

Common Name	Scientific Name
HAWAIIAN MONK SEAL	*Monachus schauinslandi*
HUMPBACK WHALE	*Megaptera novaeangliae*
SPERM WHALE	*Physeter macrocephalus*
BLUE WHALE	*Balaenoptera musculus*
FIN WHALE	*Balaenoptera physalus*
SEI WHALE	*Balaenoptera borealis*
NORTH PACIFIC RIGHT WHALE	*Eubalaena japonica*
Common Dolphin	*Delphinus delphis*
Northern Elephant Seal	*Mirounga angustirostris*
Rough-Toothed Dolphin	*Steno bredanensis*
Risso's Dolphin	*Grampus griseus*
Bottlenose Dolphin	*Tursiops truncatus*
Pantropical Spotted Dolphin	*Stenella attenuata*
Spinner Dolphin	*Stenella longirostris*
Striped Dolphin	*Stenella coeruleoalba*
Melon-Headed Whale	*Peponocephala electra*
Pygmy Killer Whale	*Feresa attenuata*
False Killer Whale	*Pseudorca crassidens*
Killer Whale	*Orcinus orca*
Short-Finned Pilot Whale	*Globicephala macrorhynchus*
Blainville's Beaked Whale	*Mesoplodon densirostris*
Cuvier's Beaked Whale	*Ziphius cavirostris*
Pygmy Sperm Whale	*Kogia breviceps*
Dwarf Sperm Whale	*Kogia sima*
Minke Whale	*Balaenoptera acutorostrata*
Bryde's Whale	*Balaenoptera edeni*
Fraser's Dolphin	*Lagenodelphis hosei*

SEA TURTLES

All sea turtles are protected under the Endangered Species Act. Those in *italics* are listed as endangered, while those in normal lettering are listed as threatened.

Common Name	Scientific Name
LEATHERBACK TURTLE	*Dermochelys coriacea*
HAWKSBILL TURTLE	*Eretmochelys imbricata*
GREEN TURTLE	*Chelonia mydas*
OLIVE RIDLEY TURTLE	*Lepidochelys olivacea*
LOGGERHEAD TURTLE	*Caretta caretta*

Last updated February 2007

HWY 336

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

U.S. FISH & WILDLIFE SERVICE

RECEIVED
MAY 30 2007
DEPARTMENT OF TRANSPORTATION
HIGHWAY-DD

DESIGN BRANCH
HIGHWAYS DIVISION
DEPT. OF TRANSPORTATION

07 MAY 29 A9:

RECEIVED
DEPT OF TRANSPORTATION

2007 MAY 23 A 10:48
HIGHWAYS DIVISION

MAY 16 2007

In Reply Refer To:
2007-SL-0166

Dr. Brennon T. Morioka
Deputy Director- Highways
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Subject: Species List Request for Kaipapau Stream Bridge Replacement, Kamehameha Highway on the Island of Oahu; HWY-DD 2.4073

Dear Mr. Morioka:

Thank you for your letter dated April 11, 2007, requesting a list of threatened and endangered species that may occur near the proposed site of a bridge replacement across Kaipapau stream on the island of Oahu. The project is located on Kamehameha Highway, State Route 83; Hauula, Koolauloa District. The scope of work will involve replacing Kaipapau Stream Bridge, improving roadway shoulders, reinforcing guardrails, and improving drainage features.

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawai'i Biodiversity and Mapping Program and the Hawaii GAP Program. Land cover information indicates that the proposed project site is low intensity development. To the best of our knowledge, no federally listed or proposed threatened or endangered species or candidate species, or proposed or designated critical habitats occur within the proposed project footprint you identified. The Hawaiian monk seal (*Monachus schauinslandi*) has been observed within 1.5 miles of the proposed project site. We recommend that you contact the National Marine Fisheries Service regarding potential impacts to seals and turtles near the proposed construction project as these species are within their jurisdiction.

We hope this information assists you in determining potential impacts to listed species. If you have questions, please contact Patrice Ashfield, Consultation and Technical Assistance Program Coordinator (phone: 808/792-9400; fax: 808/792-9581).

Sincerely,

for Patrick Leonard
Field Supervisor

TAKE PRIDE® IN AMERICA

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:
HWY 1054
HWY-DD 2.0987

MAY 1 7 2006

Ms. Marilyn F. Luipold, NEPA Coordinator
U. S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Services
Pacific Islands Regional Service
1601 Kapiolani Boulevard, Suite 1110
Honolulu, Hawaii 96814-4700

Dear Ms. Luipold:

Subject: Kamehameha Highway, Kaipapau Stream Bridge Replacement
Federal-Aid Project No. BR-083-1(48), Section 4(f) Consultation Notification

Thank you for your letter of March 31, 2006, responding to our request for your review of the proposed project subject to Section 4(f) of the Department of Transportation Act of 1966 (49 USC 303).

You expressed concern of the project's proximity to the beach area with a known Hawaiian monk seal haul-out zone and the project's potential effects to the beach area and the endangered monk seal.

On May 2, 2006, we contacted Mr. David Schofield, the Marine Mammal Response Coordinator of your Protected Resources Division. In our phone conversation, he clarified that endangered Hawaiian monk seals are known to haul-out in the general vicinity of the project area, including the mouth of Kaipapau Stream. He also stated that it is unlikely that the marine mammals will travel 350 feet up the stream to the proposed project site.

Mr. Schofield offered to visit the construction site and provide a protected wildlife briefing to the construction crew. We will advise the project contractor, upon selection, to contact your office to coordinate a briefing with the construction crew.

The project construction analysis, presently indicates all activities will take place entirely within the highway right-of-way. The proposed bridge replacement is not anticipated to negatively affect the normal activities of the endangered Hawaiian monk seal.

However, in the unlikely event that monk seals are observed in close proximity to the project site during construction, the project contractor will contact the Marine Mammal Response Coordinator to coordinate the appropriate course of action.

We sincerely appreciate your review of this document and if you have any questions, please feel free to contact Li Nah Okita at 692-7581 or Duane Taniguchi at 692-7582 of our Highways Division and reference HWY-DD 2.0987 as noted above.

Very truly yours,

BRENNON T. MORIOKA
Deputy Director-Highways

DT:rva
bc: HWY-DD(LNO)
R. M. Towill Corporation (Mr. Walter Chong)

Attachment 6

Rivers and Harbors Act Section 9

Kevin Polloi

From:	Douglas.A.Jannusch@uscg.mil on behalf of Jannusch, Douglas LT [Douglas.A.Jannusch@uscg.mil]
Sent:	Friday, October 12, 2007 3:21 PM
To:	Kevin Polloi
Cc:	Shepardson, Dale LCDR
Subject:	RE: Kaipapa'u Stream Bridge Replacement - Section 9 Consultation

Kevin, I cannot determine if we ever received the letter, but for bridge administration purposes we have no comment on this project. Thanks for closing the loop with us.

Regards,
LT Doug Jannusch
D14 Bridge Manager
808-541-2319

-----Original Message-----
From: KevinP@rmtowill.com [mailto:KevinP@rmtowill.com]
Sent: Wednesday, October 10, 2007 4:39 PM
To: Jannusch, Douglas LT
Subject: Kaipapa'u Stream Bridge Replacement - Section 9 Consultation

Doug,

The State DOT is inquiring whether USGC prepared a response for the attached letter.

This is a while back, but could you please take a look and let me know?

Thanks,

Kevin Polloi
mailto:KevinP@rmtowill.com

R. M. Towill Corporation
420 Waiakamilo Road Suite 411
Honolulu, Hawaii 96817
voice: 808 842 1133 fax: 808 842 1937 web: www.rmtowill.com

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.4075

APR 20 2007

RADM Sally Brice O'Hara
Commander, Fourteenth Coast Guard District (dpw)
300 Ala Moana Boulevard, Suite 9-216
Honolulu, Hawaii 96850-4982

Attention: Lieutenant Doug Jannusch

Dear Admiral O'Hara:

Subject: Request for Comments Section 9 Rivers and Harbors Act of 1899, (33 U.S.C. 401 and 403), Kamehameha Highway, Kaipapau Stream Bridge Replacement Federal-Aid Project No. BR-083-1(48)

The Hawaii State Department of Transportation (HDOT) Highways Division, proposes to replace the Kaipapau Stream Bridge along with improved roadway shoulders, reinforced guardrails, and drainage features. The project is located on Kamehameha Highway, State Route 83; Hauula, Koolauloa District. See *Figure 1, Location Map* and *Figure 2, Site Plan*.

As part of the overall planning effort, we request your evaluation if the subject project is in accordance with Section 9 of the Rivers and Harbors Act of 1899. If the subject project is not in accordance with Section 9 of the Rivers and Harbors Act of 1899, please provide guidance on bridge permit requirements.

The purpose of this project is to fulfill HDOT's mandate to maintain the functional and structural integrity of bridges on State roadways. In fulfillment of this mandate, the Highways Division conducts regular inspections of bridges within its jurisdiction and makes recommendations to modify or replace structurally deficient bridges to meet current standards for roadway widths and safety features as specified by the American Association of State Highway and Transportation Officials and HDOT design criteria. Current standards for highway speed, loading, sight distances, guard railings, and other safety measures will be used in the design of the project.

A water quality and biological study was conducted for the project. The report provides a general site description of the stream. A copy of the report is attached for your reference.

Please submit any written comments to us within 30 days from the date of this letter.

We appreciate your review of the subject materials. Please contact Li Nah Okita at 692-7581 or Duane Taniguchi at 692-7582 of our Highways Division, Design Section if there are any questions and reference HWY-DD 2.4075 as noted above.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Deputy Director-Highways

Attachments

Attachment 7

National Historic Preservation Act Section 106

RECEIVED

'06 JUL 13 P6:06

DESIGN BRANCH
HIGHWAYS DIVISION
DEPT. OF TRANSPORTATION

DEPT OF TRANSPORTATION

2006 JUL 12 A 9:03

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
JUL 14 2006
LO/DT
DEPARTMENT OF TRANSPORTATION
HIGHWAY-DO

HIGHWAYS DIVISION

July 6, 2006

Glenn M Yasui, Administrator
Department of Transportation – Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

LOG NO: 2006.2157
DOC NO: 0607BF09
Architecture

Dear Mr. Yasui:

SUBJECT: Section 106 (NHPA) Review
RE: Kaipapau Stream Bridge Replacement HWY – DB 2.0785
Project Location: Kamehameha Highway, Oahu
Hauula Ahupuaa, Koolauloa District, Oahu
TMK: (1) 5-4-11

This letter is in response to your letter dated April 25, 2006 which we received on April 24, 2006.

The SHPD has reviewed your letter initiating the Section 106 process for the proposed replacement of the Kaipapau Stream Bridge. The proposed project entails the demolition of the extant Kaipapau Stream Bridge and replacing it with a 100 – foot long by 57 – foot wide, pre – stressed concrete plank bridge with a cast-in-place bridge deck.

The 1983 *Historic Bridge Inventory, Island of Oahu* identified this particular bridge as having poor aesthetics and poor integrity. However, the inventory identified the bridge as significant due for its transportation link of the Windward communities and because of it was built by one of Honolulu's prominent builders, L. L. McCandless.

The SHPD concludes that the proposed project will have no adverse effect with the condition that the bridge be photographed before demolition. These photographs may be in digital or print format.

Thank you for the opportunity to comment. Should you have any questions regarding architectural concerns please call Bryan Flower at our Oahu office at (808) 692-8028.

Sincerely,

Peter T. Young, Chairperson
State Historic Preservation Officer

BF:jen

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

May 2, 2007

Mr. Duane Taniguchi
Department of Transportation
Highways Division
601 Kamokila Boulevard, Room 609
Kapolei, Hawai'i 96707

LOG NO: 2007.1329
DOC NO: 0704amj38
Archaeology

Dear Mr. Taniguchi:

SUBJECT: National Historic Preservation Act (NHPA) Section 106 Review – Draft Environmental Assessment for Kaipapa'u Stream Bridge Replacement Federal Aid Project No. BR-083-1(48) Kaipapa'u Ahupua'a, Ko'olauloa District, Island of Oahu <u>TMK (1) 5-4-011 and 018</u>

Thank you for continuing consultation on this project. The proposed undertaking consists of replacing the existing highway bridge at Kaipapa'u Stream on Kamehameha Highway with a wider bridge, constructing wider travel lanes, shoulders, ADA-compliant pedestrian walkway / bicycling facilities, reinforced guardrails, and drainage features. Because this project uses federal funds, it is subject to National Historic Preservation Act (NHPA) Section 106 review.

In a previous letter, we stated our concerns regarding your determination of effect on historic properties for this project. We requested subsurface testing in the form of an archaeological inventory survey of the area of potential effect (APE), prior to any ground-disturbing activities, given the location of the project area (*i.e.*, in sandy, coastal deposits) as well as the previous documentation of numerous Native Hawaiian burials near the project area.

Subsequently, we met with representatives of your staff to discuss the project in greater detail. At this meeting, you provided our office with additional specific details of previous ground disturbance and proposed ground disturbance in the APE. According to the additional documents you provided (on file at SHPD), and our more detailed discussions, we agree to rescind our requirement for an archaeological inventory survey, and, instead, require that archaeological monitoring be conducted, in association with planned ground disturbance, of any potentially sensitive areas of the APE.

Please prepare and submit to our office for review an archaeological monitoring plan (AMP), in accordance with §13-279, HAR. In particular, the AMP should clearly state which areas of the APE are to be monitored, and provide documentary justification for why some areas need not be monitored.

We thank you again for continuing consultation on this project, and look forward to receipt of an AMP meeting the requirements of §13-279, HAR.

Once we have accepted the AMP, we will then be able to concur with your determination of "no adverse effect" for the proposed undertaking.

Please contact Ms. Melanie Chinen at (808) 692-8019 if you have any questions or concerns about this letter.

Aloha,

Melanie Chinen

Peter Young, Chair
State Historic Preservation Officer

AMJ

cc: Mr. Chester Koga, R.M. Towill Corporation
Mr. Jesse Yorcke, Office of Hawaiian Affairs
Ms. Genevieve Salmonson, Office of Environmental Quality Control

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

February 6, 2010

Mr. David Shideler
Cultural Surveys Hawai'i
P. O. Box 1114
Kailua, Hawai'i 96736

LOG NO: 2010.0340
DOC NO: 1002NM05
Archaeology

Dear Mr. Shideler:

SUBJECT: 6E-42 Historic Preservation Review--
Archaeological Monitoring Plan—
For Kaipapau Stream Bridge Replacement
Kaipapapau Ahupua'a, Koolauloa District, O'ahu Island, Hawai'i
TMK: (1) 5-4-011 and 5-4-018

Thank you for providing us the opportunity to review this (Archaeological Monitoring Plan (AMP), (*Archaeological Monitoring Plan For Kaipapau Stream Bridge Replacement Project, Kaipapau Streaqm Bridge, Kaipapau Ahupua'a, Koolauloa District, O'ahu Island, Hawai'i, TMK: (1)5-4-001 [Hammatt PhD and Shideler, January 2010]*) which we received on January 22, 2010.

This plan presents the protocols for archaeological monitoring of demolition of abutments. This AMP is accepted and meets the minimum standards for compliance under Hawai'i administrative Rules (HAR) §13-13-279 *Rules Governing Standards for Archaeological Monitoring Studies and Reports.*

Please send one a text-searchable PDF version on CD to the attention of the "**SHPD Library**" at the Kapolei SHPD office with a copy of this acceptance letter.

We would like to see research questions based on the predictability model for monitoring these projects.

Please contact me at (808) 692-8015 if you have any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO),
Archaeology and Historic Preservation Manager

Galloway, Peter C POH

From: Kevin Polloi [KevinP@rmtowill.com]
Sent: Monday, March 29, 2010 3:52 PM
To: Galloway, Peter C POH
Cc: Li.Nah.Okita@hawaii.gov; Walter Chong; Chester Koga
Subject: Archaeological Monitoring Plan for the Kaipapa'u Stream Bridge Replacement Project Archaeological Monitoring Plan SHPD acceptance
Attachments: Kaipapau Stream Bridge Monitoring Plan SHPD acceptance.pdf

Peter,

Following up our phone conversation this morning (March 29,2010).

The State Historic Preservation Division (SHPD) accepted the Archaeological Monitoring Plan for the subject project on February 6, 2010. Please see attached SHPD letter.

Regarding actual archaeological monitoring during construction, we will recommend to DOT that language be included in the construction documents that the contractor is required to employ a qualified archaeologist that is licensed to work in the State of Hawaii to perform the monitoring work. The only identified historic property within the project site is the existing bridge. In their letter dated July 6, 2006, SHPD determined that the project will have no adverse effect to the historic bridge with the condition that the bridge be photographed prior to demolition. Any impacts to previously unknown archaeological properties unearthed during ground disturbance activities will be mitigated for through consultation with SHPD.

This project is a replacement of an existing substandard bridge within an existing roadway corridor. A Traditional Cultural Practices Assessment was conducted in March of 2003 for the project and is included as Appendix A of the Draft and Final Environmental Assessments for the project. The Traditional Cultural Practices Assessment indicated that no traditional cultural practices were identified within the project area that would be stopped by the proposed bridge replacement.

The Office of Hawaiian Affairs previously commented during a Section 106 Consultation (March 7,2006), that Mr. Roland "Ahi" Logan and Mrs.Cathleen Matoon be contacted for comments regarding this project. Mr. Logan was consulted during the preparation of the Traditional Cultural Practices Assessment, while Mrs. Matoon provided comments as part of the Section 106 Consultation.

Regarding the displacement of residents, one residential dwelling, belonging to Mr. Glenn Christensen, will be demolished to accommodate the replacement bridge. The occupants of three (3) residences immediately adjacent to the project site will be temporarily relocated due to construction noise and access impacts. As required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, the Department of Transportation - Highways Division will provide compensation and/or relocation for the temporary and permanent displacement of the affected residents. The Department of Transportation - Highways Division is working to prepare the relocation package for the project. Please also refer to Section 5.2 of the subject project's Final Environmental Assessment.

Should you have any questions or comments, please do not hesitate to contact either Chester Koga or myself at 842-1133.

Thank you, Peter.

Aloha,
Kevin Polloi
Planner
R.M. TOWILL CORPORATION
2024 N. King Street, Suite 200
Honolulu, Hawaii 96819-3494
Phone: (808) 842-1133
Fax: (808) 842-1937
Email: KevinP@rmtowill.com
Web: www.rmtowill.com

Attachment 8

Special Management Area Approval (Resolution 278-CD1)

OFFICE OF THE CITY CLERK

CITY AND COUNTY OF HONOLULU

HONOLULU, HAWAII 96813-3077 / TELEPHONE 768-3810

DENISE C. DE COSTA
CITY CLERK

October 26, 2007

Mr. Chester Koga
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817

Dear Mr. Koga:

This is to inform you that Resolution 07-278, CD1, granting a Special Management Area Use Permit to the State Department of Transportation, for demolition of an existing bridge over Kaipapau Stream and construction of a new bridge, at Hauula, Oahu, was adopted by the Council of the City and County of Honolulu on Wednesday, October 17, 2007.

Sincerely,

Denise C. De Costa

DENISE C. DE COSTA
City Clerk

ah

Attachment

C-KOGA

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 07-278, CD1

RESOLUTION

GRANTING A SPECIAL MANAGEMENT AREA USE PERMIT FOR CONSTRUCTION OF A NEW BRIDGE OVER KAIPAPAU STREAM AT HAUULA, OAHU.

WHEREAS, the Department of Planning and Permitting (DPP) on June 22, 2007 accepted the application (File No. 2007/SMA-32) of the State Department of Transportation, herein referred to as the Applicant, for a Special Management Area Use Permit (SMP) for demolition of an existing bridge over Kaipapau Stream, and construction of a new bridge, located at 54-241, -252, -260, -261, -264, -266, and -269 Kamehameha Highway; and, 54-20 and -22 Pipilani Place, Hauula, Oahu, and identified as Tax Map Keys 5-4-11: 4, 6, 7, 20, and 21; and 5-4-18: 1 through 5; and

WHEREAS, on August 14, 2007, the DPP held a public hearing which was attended by representatives of the Applicant and nine members of the public; and

WHEREAS on August 29, 2007, within 10 working days after the close of the public hearing, the DPP having duly considered all evidence and the review guidelines as established in Sections 25-3.1 and 25-3.2, Revised Ordinances of Honolulu (ROH), completed its report and transmitted its findings and recommendation of approval to the Council; and

WHEREAS, the City Council, having received the findings and recommendation of the DPP on August 29, 2007, and at its meeting of OCT 17 2007, having duly considered all of the findings and reports on the matter, approved the subject application for an SMP with the conditions enumerated below; now, therefore,

BE IT RESOLVED by the Council of the City and County of Honolulu that an SMP be issued to the Applicant under the following conditions:

A. Construction shall be in substantial conformance with the master plan, as shown on Attachments "A" through "C," and Exhibits "B-1" through "B-12," attached hereto.

B. Prior to issuance of development permits, the Applicant shall provide the DPP with written confirmation from the DLNR, State Historic Preservation Division (SHPD), that photographs of the existing bridge and an acceptable archaeological monitoring plan have been submitted and approved.

C. Prior to the application for development permits, the Applicant shall submit to the DPP:

1. Written confirmation from the DLNR, Aquatic Resources Division, that DLNR has approved a construction timeline showing that no in-stream activities will be scheduled during the spawning season (i.e., August through October) of the native fish inhabiting the stream; and

2. A construction timeline, for review and approval by the DPP, showing the period(s) when vegetation will be removed from the banks. These periods should occur outside the rainy season (i.e., from May through September). Or, the Applicant may submit an alternate proposal meeting the intent of this condition.

D. An erosion contingency plan shall be submitted to the DPP for its review and approval prior to the application for any development permits. The erosion control plan shall include the following elements:

1. Identification of appropriate corrective actions depending upon on the type of erosion which may occur; and

2. A schedule of periodic monitoring and reporting to the DPP.

E. The Applicant shall make available, during all phases of the construction, a public outreach person to provide the general public with information about project construction activities and to answer questions and/or resolve complaints about project construction from the general public. The Applicant shall publicize and maintain a telephone "hotline" to facilitate this process.

F. Prior to the issuance of development permits, the Applicant shall contact the Marine Mammal Response Coordinator of the National Marine Fisheries Service (NMFS) Protected Resources Division (phone 944-2200), to schedule a briefing for the construction crew. The Applicant shall provide the DPP with written confirmation from the NMFS that a briefing has been requested.

G. Prior to the issuance of development permits, the Applicant shall provide the DPP with written confirmation from the NMFS that he has agreed to adhere to the terms and conditions of the National Oceanic and Atmospheric Administration (NOAA) Fisheries Protocol for "No Effect" Concurrence pertaining to monk seals, including the following elements:

1. A survey of the project area (including reconnaissance of the beach area downstream from the project site) shall be performed just prior to commencement or resumption of construction activity to ensure that no

protected species are in the project area. If protected species are detected, construction activities must be postponed until the animal(s) voluntarily leave the area;

2. If any listed species enters the area during the conduct of construction activities, all activities shall cease until the animal(s) voluntarily depart the area;

3. The Applicant shall ensure that all on-site project personnel are apprised of the status of any listed species potentially present in the project area and the protections afforded to those species under Federal laws;

4. Any incidental take of marine mammals shall be reported immediately to NOAA Fisheries' 24-hour hotline at 1-888-256-9840. Information reported must include the name and phone number of a point of contact, location of the incident, and nature of the take and/or injury;

5. Appropriate best management practices (BMPs) shall be implemented as applicable to minimize turbidity, minimize species disturbance, and to avoid the release of pollutants into the water; and

6. Any intake pipes on project-related equipment shall be screened or otherwise configured to ensure the prevention of entrainment of protected species.

H. In conformance with the standard recommendation of the DLNR, Division of Forestry and Wildlife, the Applicant shall incorporate the use of shielded lighting, to reduce the possibility that seabirds may become disoriented and harmed by the lighting. The shielded lighting shall be implemented both during and after bridge construction, and shall be specified on the building permit plans.

I. The Applicant shall maintain the site (including construction easements) in a clean condition at all times, to protect private and public property as well as the water quality of the stream and ocean.

J. Approval of this Special Management Area Use Permit does not constitute compliance with other Land Use Ordinance or governmental agencies' requirements, including building or grading permit approval. They are subject to separate review and approval. The Applicant shall be responsible for ensuring that the final plans for the project approved under these permits comply with all applicable Land Use Ordinance and other governmental agencies' provisions and requirements.

K. Construction shall be in general conformity with the plans on file with the Department of Planning and Permitting and in accordance with the Land Use Ordinance. Any change in the size or nature of the project which has a significant effect on coastal resources addressed in Chapter 25, ROH, shall require a new application. Any change which does not have a significant effect on coastal resources shall be considered a minor modification and therefore permitted under this resolution, upon review and approval of the Director of Planning and Permitting.

BE IT FINALLY RESOLVED by the Council of the City and County of Honolulu that the Clerk be and is directed to transmit copies of this resolution to Henry Eng, FAICP, Director of Planning and Permitting; Glenn M. Yasui, Highways Administrator, State of Hawaii, Department of Transportation, 869 Punchbowl Street, Honolulu, Hawaii 96813; and Chester Koga, R. M. Towill Corporation, 420 Waiakamilo Road, Suite 411, Honolulu, Hawaii 96817.

INTRODUCED BY:

Barbara Marshall (BR)

____

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____

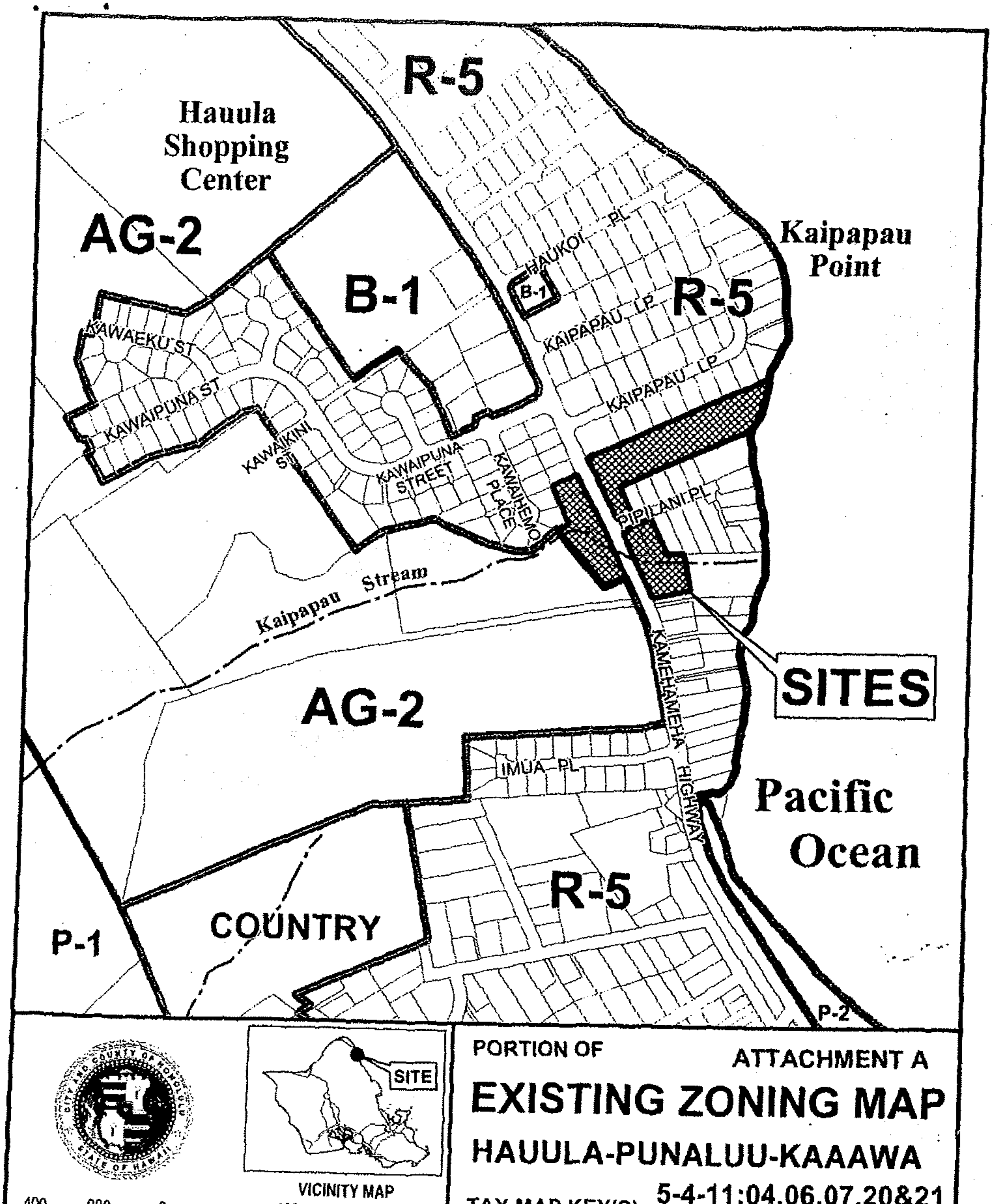
____

____

Councilmembers

DATE OF INTRODUCTION:

September 04, 2007
Honolulu, Hawaii



Prepared by: Department of Planning & Permitting
City and County of Honolulu

Date Prepared: June 2007

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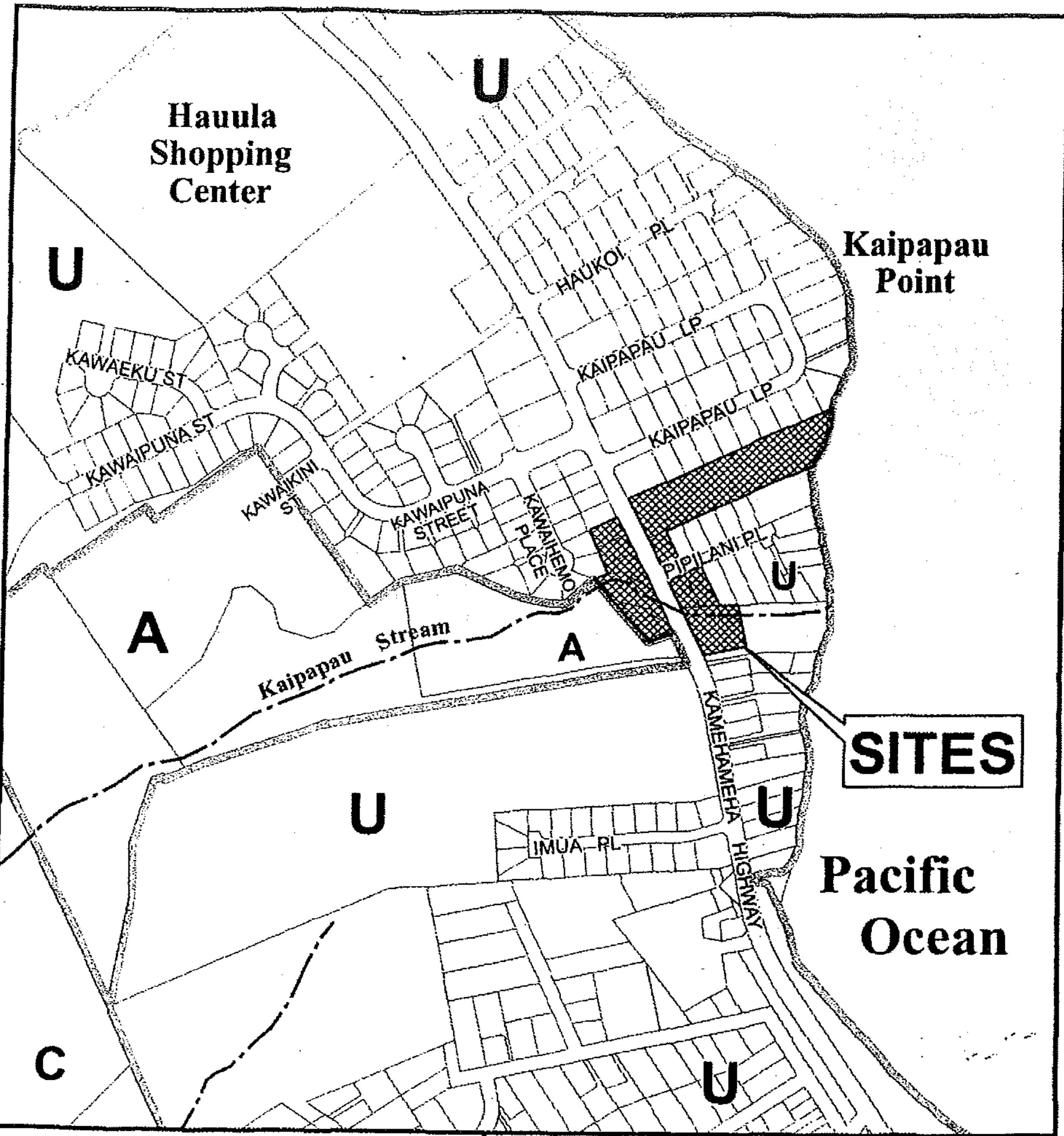
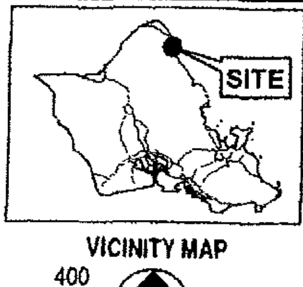
ATTACHMENT "A"





PORTION OF

ATTACHMENT B

STATE LAND USE MAP

HAUULA

TAX MAP KEY(S): 5-4-11:04,06,07,20&21 and 5-4-18:01 to 05

FOLDER NO.: 2007/SMA-32

Prepared by: Department of Planning & Permitting
City and County of Honolulu

Date Prepared: June 2007

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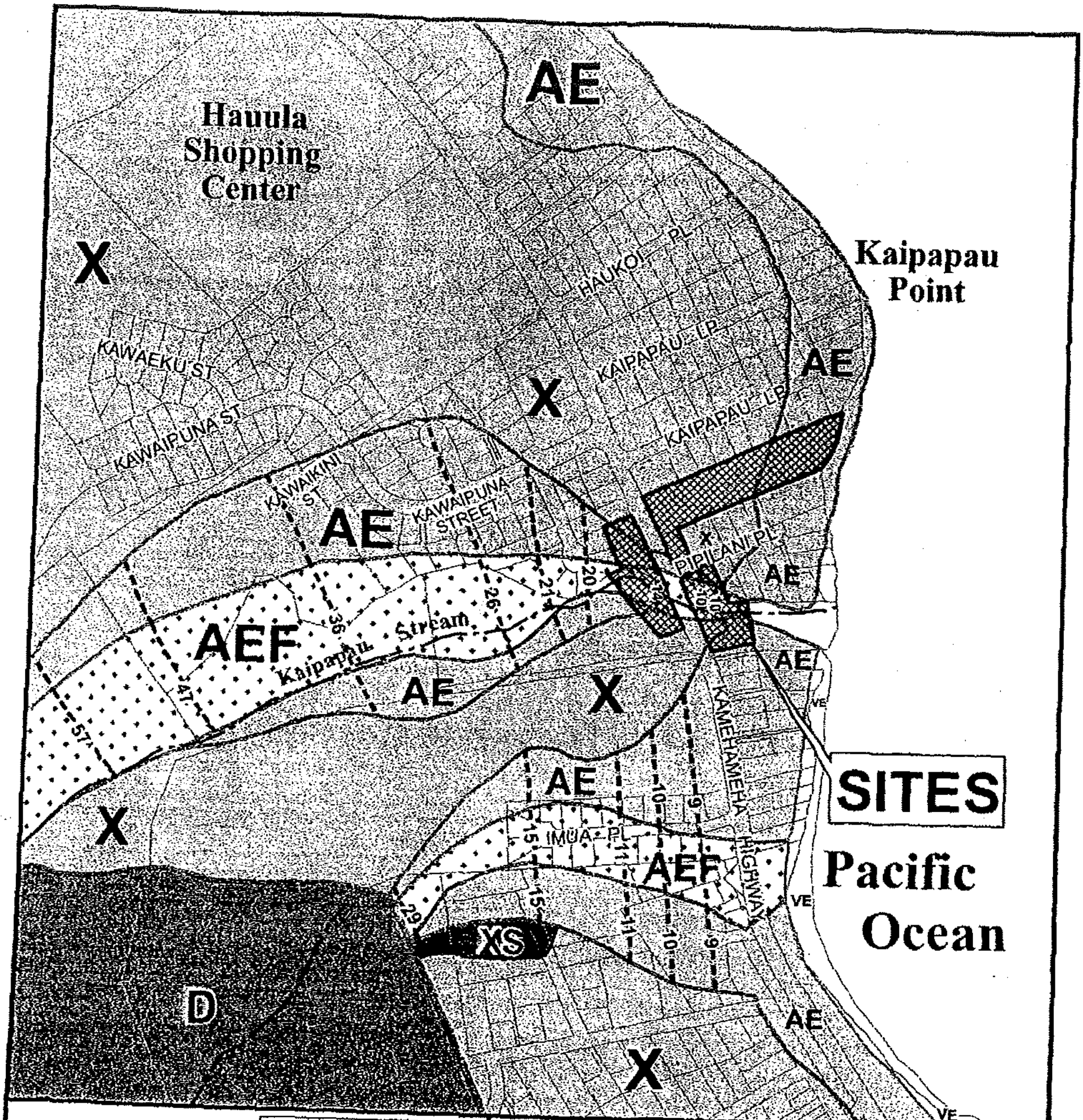
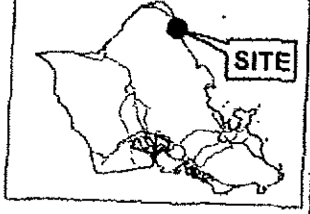
ATTACHMENT "B"





400 200 0 400

Scale in Feet

VICINITY MAP

PORTION OF

FLOOD MAP ATTACHMENT C

TAX MAP KEY(S): 5-4-11:04,06,07,20&21 and 5-4-18:01 to 05

FOLDER NO.: 2007/SMA-32

Prepared by: Department of Planning & Permitting
City and County of Honolulu

Date Prepared: June 2007

ATTACHMENT "C"

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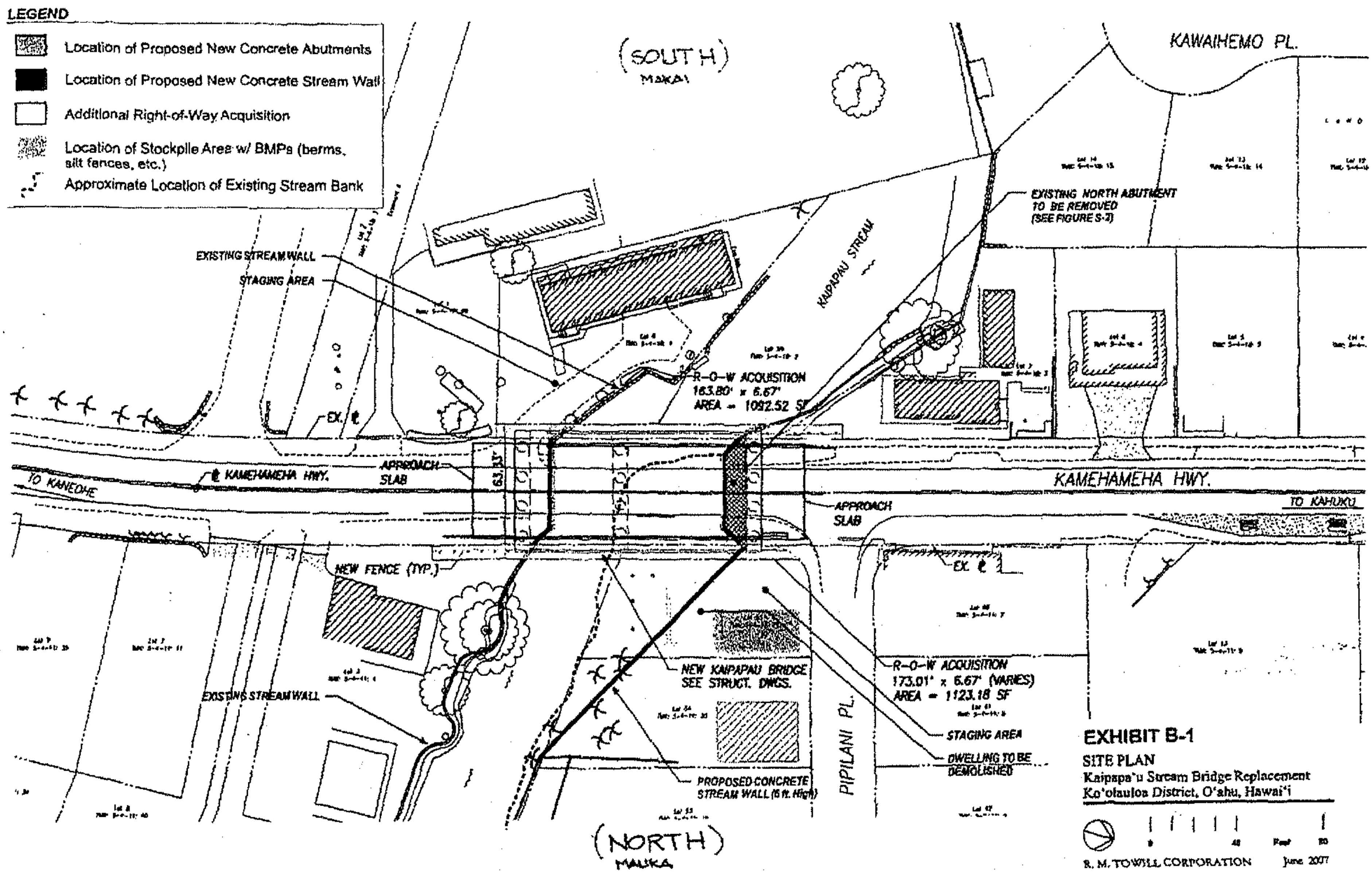


LEGEND
Location of Proposed New Concrete Abutments
Location of Proposed New Concrete Stream Wall
Additional Right-of-Way Acquisition
Location of Stockpile Area w/ BMPs (berms, silt fences, etc.)
Approximate Location of Existing Stream Bank
(SOUTH)
MAKAI
KAWAIHEMO PL.
EXISTING NORTH ABUTMENT TO BE REMOVED (SEE FIGURE S-3)
KAIPAPAU STREAM
EXISTING STREAM WALL
STAGING AREA
R-O-W ACQUISITION
163.80' x 6.67'
AREA = 1092.52 SF
EX. ℄
℄ KAMEHAMEHA HWY.
TO KANEOHE
APPROACH SLAB
63.33'
KAMEHAMEHA HWY.
TO KAHUKU
APPROACH SLAB
NEW FENCE (TYP.)
EX. ℄
NEW KAIPAPAU BRIDGE SEE STRUCT. DWGS.
R-O-W ACQUISITION
173.01' x 6.67' (VARIES)
AREA = 1123.18 SF
STAGING AREA
DWELLING TO BE DEMOLISHED
EXISTING STREAM WALL
PROPOSED CONCRETE STREAM WALL (6 ft. High)
PIPILANI PL.
(NORTH)
MAUKA
EXHIBIT B-1
SITE PLAN
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i
0
40
Feet
80
R. M. TOWILL CORPORATION
June 2007

EXHIBIT B-1

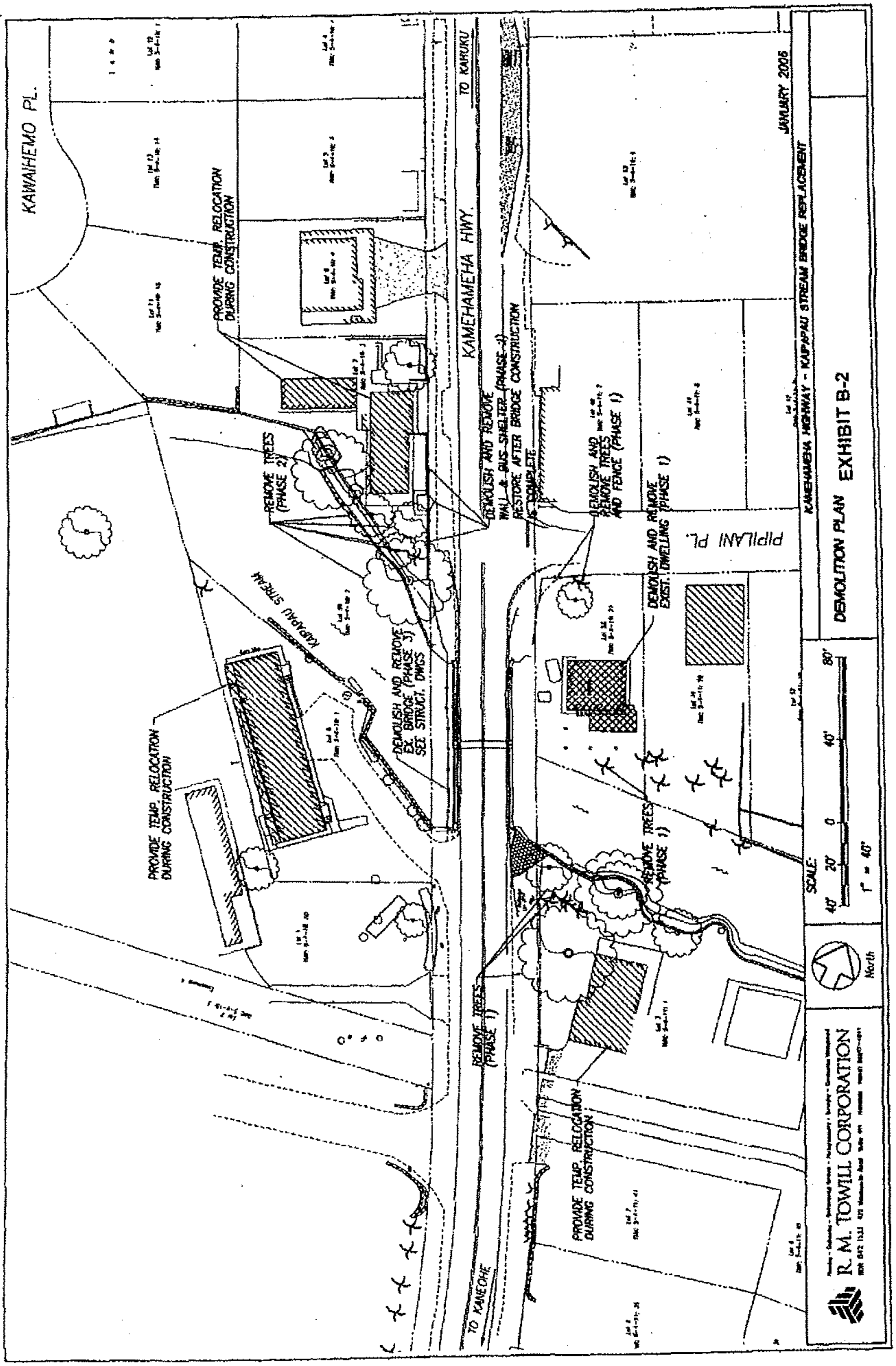

KAWAIHEMO PL.
PROVIDE TEMP. RELOCATION DURING CONSTRUCTION
KAMEHAMEHA HWY.
TO KAHUKU
TO KANEOHE
REMOVE TREES (PHASE 2)
DEMOLISH AND REMOVE WALL & BUS SHELTER (PHASE 1) RESTORE AFTER BRIDGE CONSTRUCTION IS COMPLETE
DEMOLISH AND REMOVE TREES AND FENCE (PHASE 1)
PIPILANI PL.
DEMOLISH AND REMOVE EXIST. DWELLING (PHASE 1)
KAPAPAU STREAM
DEMOLISH AND REMOVE EX. BRIDGE (PHASE 3) SEE STRUCT. DWGS
PROVIDE TEMP. RELOCATION DURING CONSTRUCTION
REMOVE TREES (PHASE 1)
REMOVE TREES (PHASE 1)
PROVIDE TEMP. RELOCATION DURING CONSTRUCTION
PROVIDE TEMP. RELOCATION DURING CONSTRUCTION
JANUARY 2006
KAMEHAMEHA HIGHWAY - KAPAPAU STREAM BRIDGE REPLACEMENT
DEMOLITION PLAN
EXHIBIT B-2
SCALE:
40' 20' 0 40' 80'
1" = 40'
North
R. M. TOWILL CORPORATION

EXHIBIT B-2

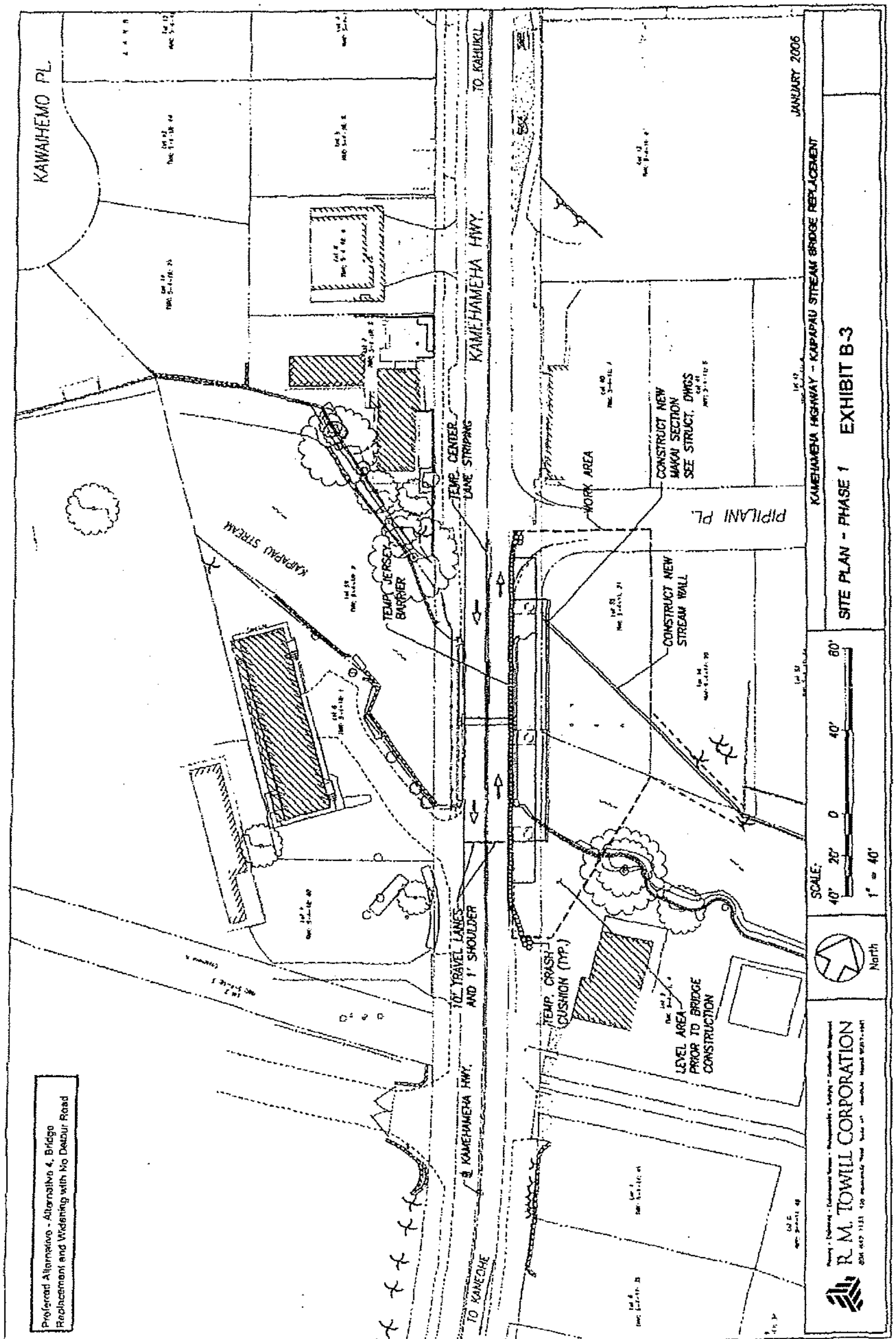

KAWAIHEMO PL.
TO KAHUKU
KAMEHAMEHA HWY.
TEMP. CENTER LANE STRIPING
KAPAPAU STREAM
TEMP. JERSEY BARRIER
WORK AREA
CONSTRUCT NEW MAKAI SECTION SEE STRUCT. DWGS
PIPILANI PL.
CONSTRUCT NEW STREAM WALL
TEMP. CRASH CUSHION (TYP.)
LEVEL AREA PRIOR TO BRIDGE CONSTRUCTION
℄ KAMEHAMEHA HWY.
TO KANEOHE
Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
SCALE:
40' 20' 0 40' 80'
1" = 40'
North
R. M. TOWILL CORPORATION
KAMEHAMEHA HIGHWAY - KAIPAPAU STREAM BRIDGE REPLACEMENT
JANUARY 2006
SITE PLAN - PHASE 1
EXHIBIT B-3

EXHIBIT B-3

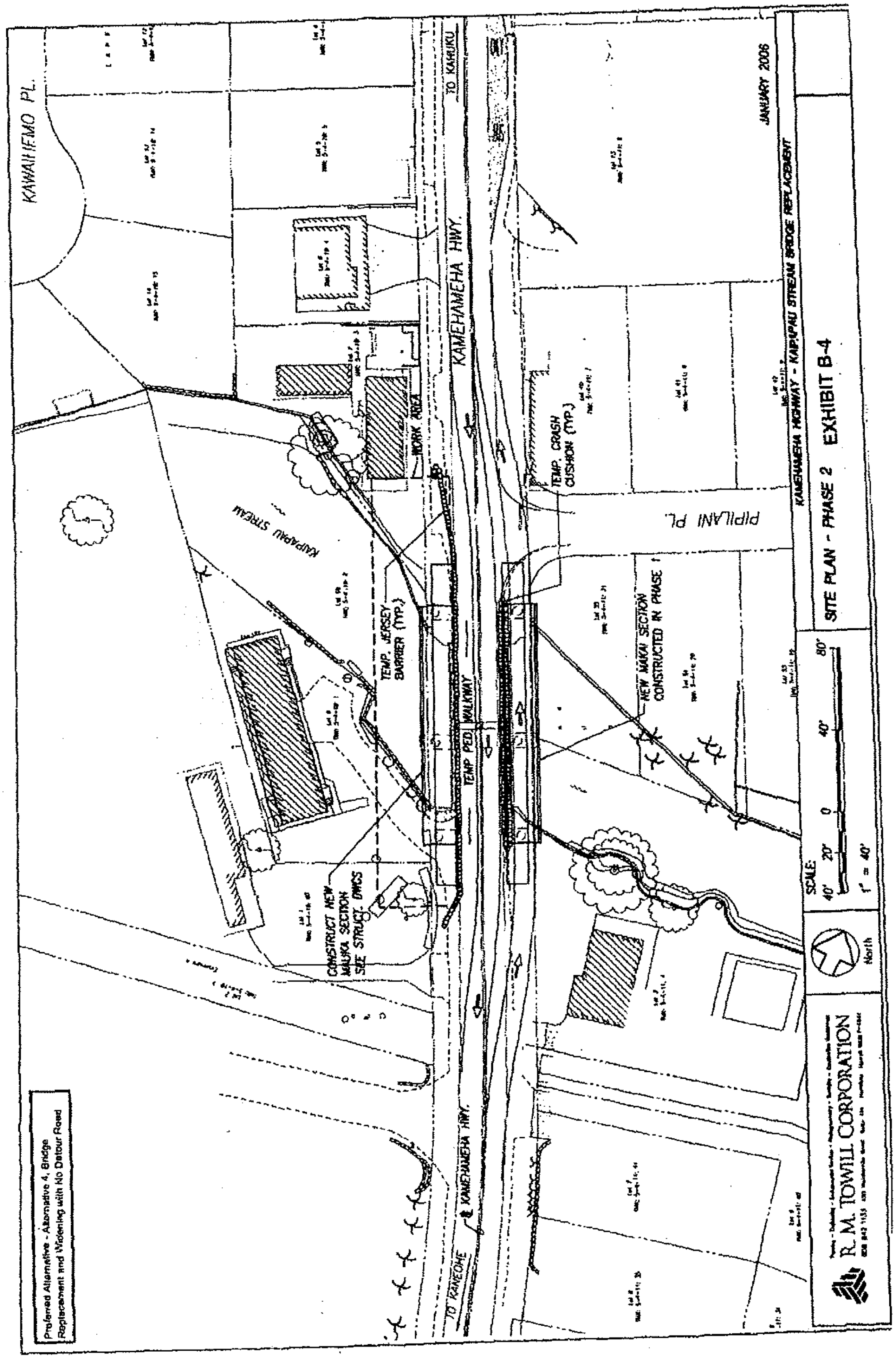

KAWAIHEMO PL.
TO KAHUKU
KAMEHAMEHA HWY.
WORK AREA
TEMP. CRASH CUSHION (TYP.)
PIPILANI PL.
KAIPAPAU STREAM
TEMP. JERSEY BARRIER (TYP.)
TEMP PED WALKWAY
NEW MAKAI SECTION CONSTRUCTED IN PHASE 1
CONSTRUCT NEW MAUKA SECTION SEE STRUCT. DWGS
TO KANEOHE
KAMEHAMEHA HWY.
Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
SCALE:
40' 20' 0 40' 80'
1" = 40'
North
R. M. TOWILL CORPORATION
SITE PLAN - PHASE 2
EXHIBIT B-4
KAMEHAMEHA HIGHWAY - KAIPAPAU STREAM BRIDGE REPLACEMENT
JANUARY 2006

EXHIBIT B-4

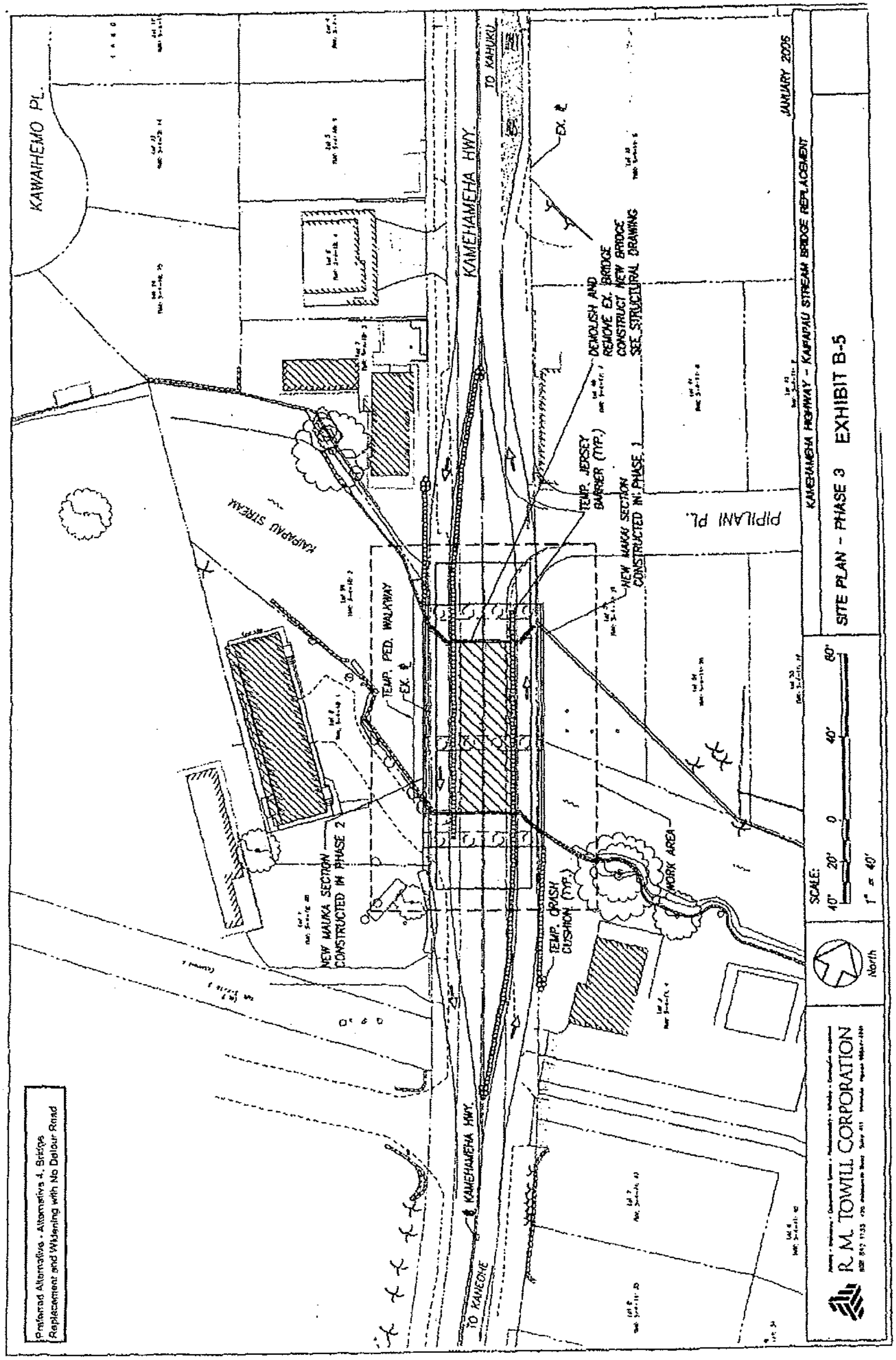

Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
KAWAIHEMO PL.
KAMEHAMEHA HWY.
TO KAHUKU
EX. ℄
DEMOLISH AND REMOVE EX. BRIDGE CONSTRUCT NEW BRIDGE SEE STRUCTURAL DRAWING
TEMP. JERSEY BARRIER (TYP.)
NEW MAKAI SECTION CONSTRUCTED IN PHASE 1
PIPILANI PL.
KAIPAPAU STREAM
TEMP. PED. WALKWAY
EX. ℄
NEW MAUKA SECTION CONSTRUCTED IN PHASE 2
TEMP. CRASH CUSHION (TYP.)
WORK AREA
℄ KAMEHAMEHA HWY.
TO KANEOHE
JANUARY 2005
KAMEHAMEHA HIGHWAY - KAIPAPAU STREAM BRIDGE REPLACEMENT
SITE PLAN - PHASE 3
EXHIBIT B-5
SCALE: 40' 20' 0 40' 80'
1" = 40'
North
R. M. TOWILL CORPORATION

EXHIBIT B-5

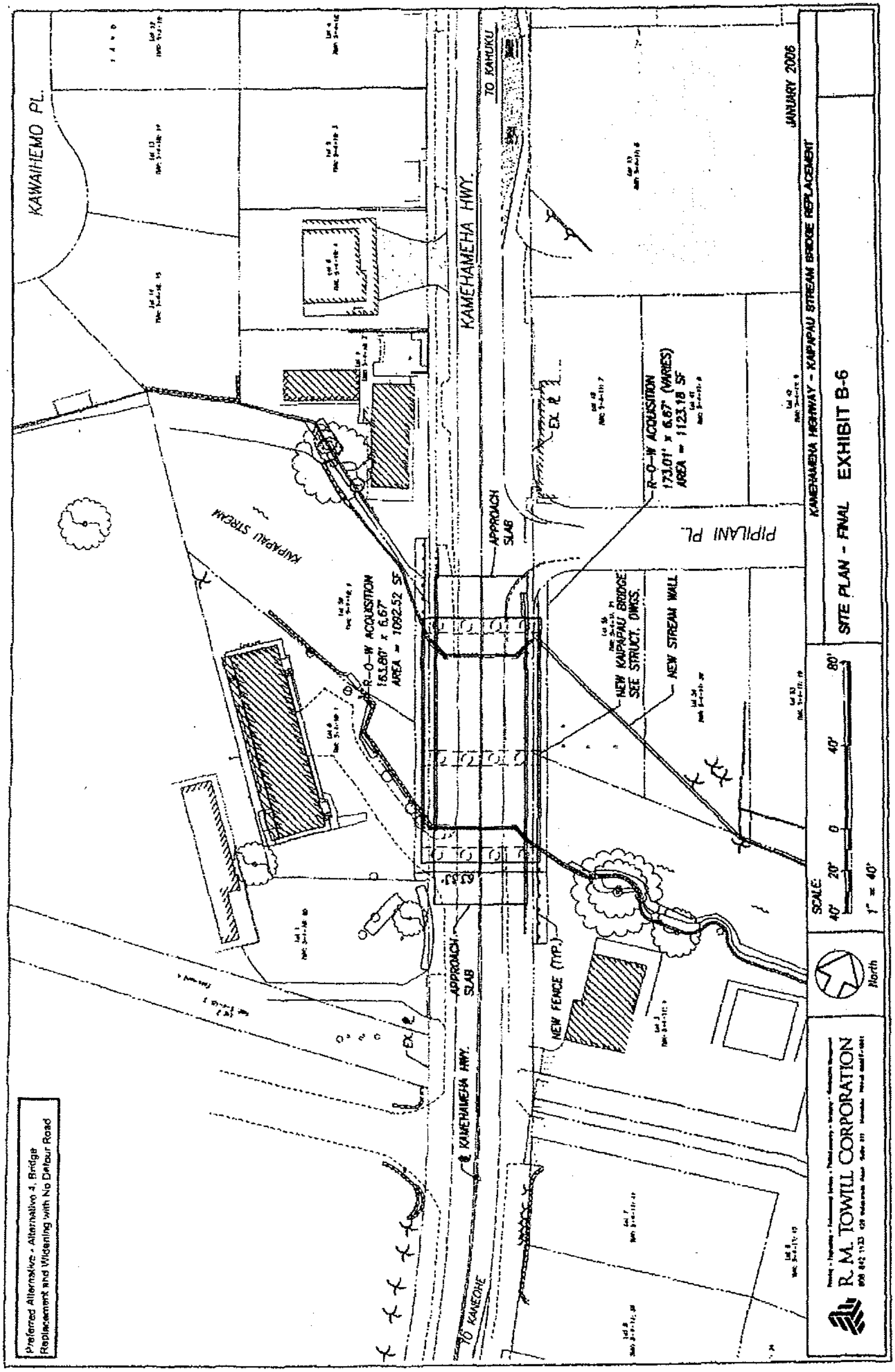

Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
KAWAIHEMO PL.
KAMEHAMEHA HWY.
TO KAHUKU
KAIPAPAU STREAM
R-O-W ACQUISITION 163.80' x 6.67' AREA = 1092.52 SF
R-O-W ACQUISITION 173.01' x 6.67' (VARIES) AREA = 1123.18 SF
EX. ℄
APPROACH SLAB
PIPILANI PL.
NEW KAIPAPAU BRIDGE SEE STRUCT. DWGS.
NEW STREAM WALL
NEW FENCE (TYP.)
APPROACH SLAB
EX. ℄
℄ KAMEHAMEHA HWY.
TO KANEOHE
JANUARY 2006
KAMEHAMEHA HIGHWAY - KAIPAPAU STREAM BRIDGE REPLACEMENT
SITE PLAN - FINAL
EXHIBIT B-6
SCALE:
40' 20' 0 40' 80'
1" = 40'
North
R. M. TOWILL CORPORATION

EXHIBIT B-6

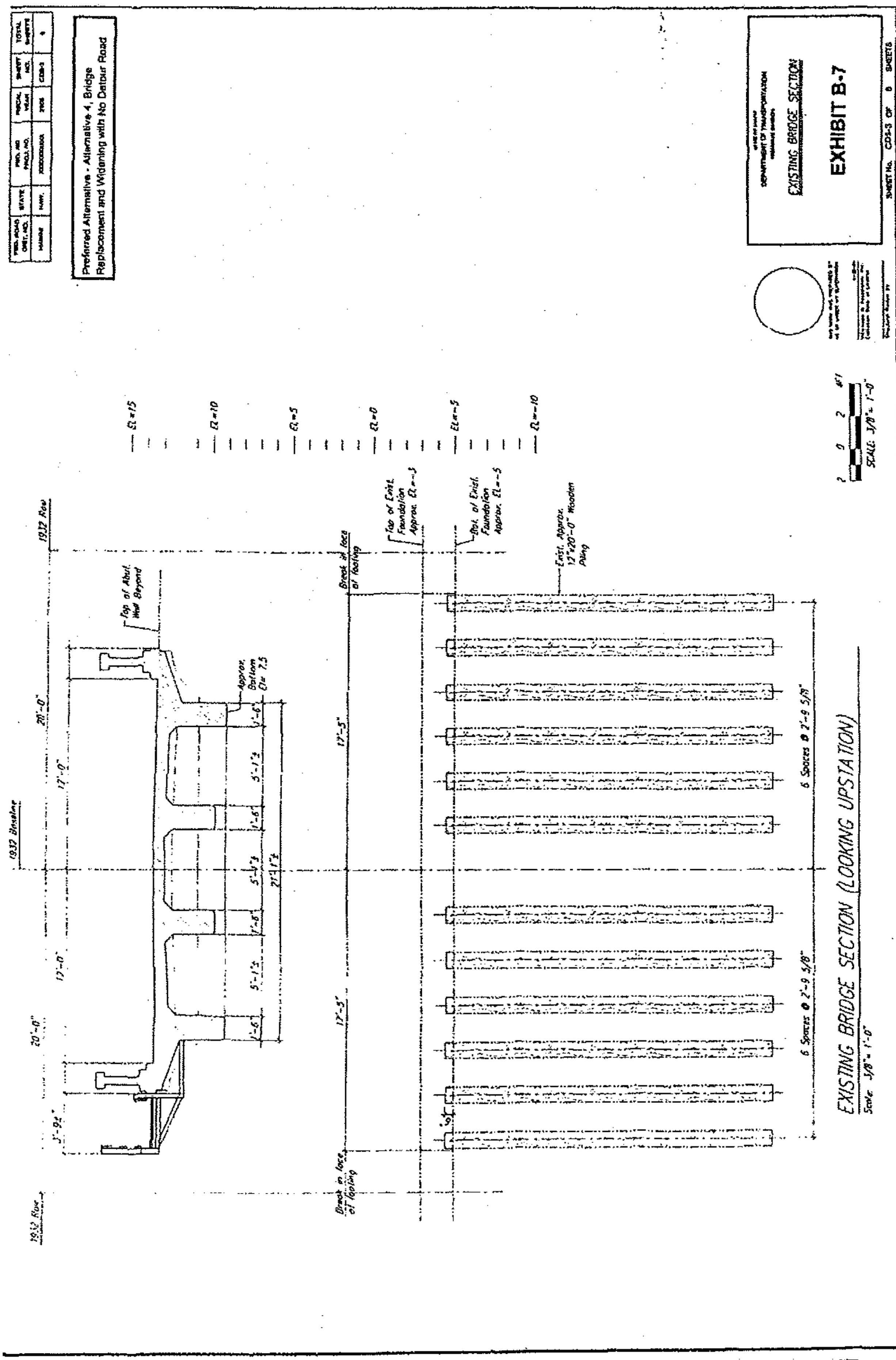
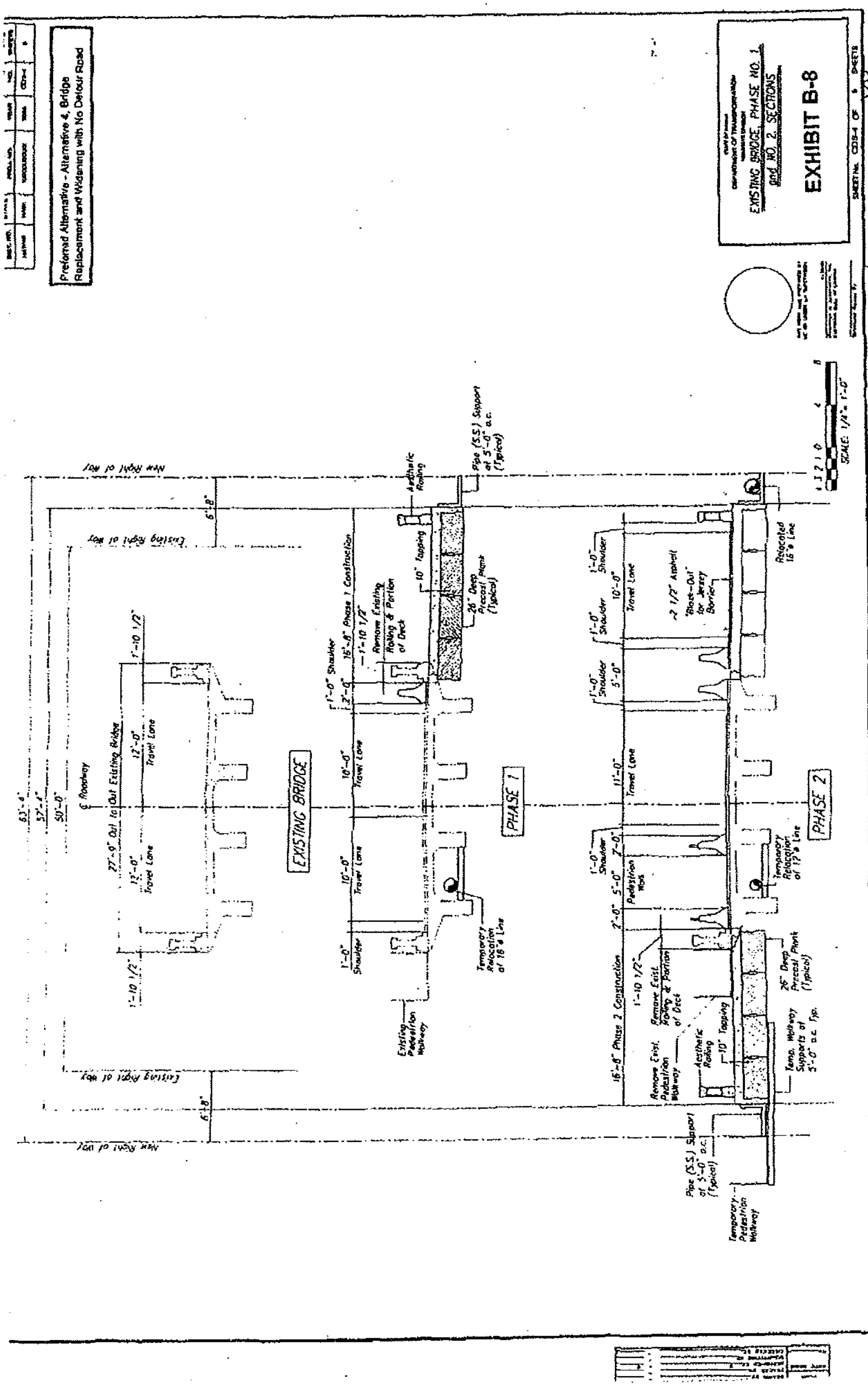

Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
EXISTING BRIDGE SECTION (LOOKING UPSTATION)
Scale 3/8" = 1'-0"
6 Spaces @ 2'-9 5/8"
EXISTING BRIDGE SECTION
EXHIBIT B-7

EXHIBIT B-7



Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
EXISTING BRIDGE
PHASE 1
PHASE 2
EXHIBIT B-8

EXHIBIT B-8

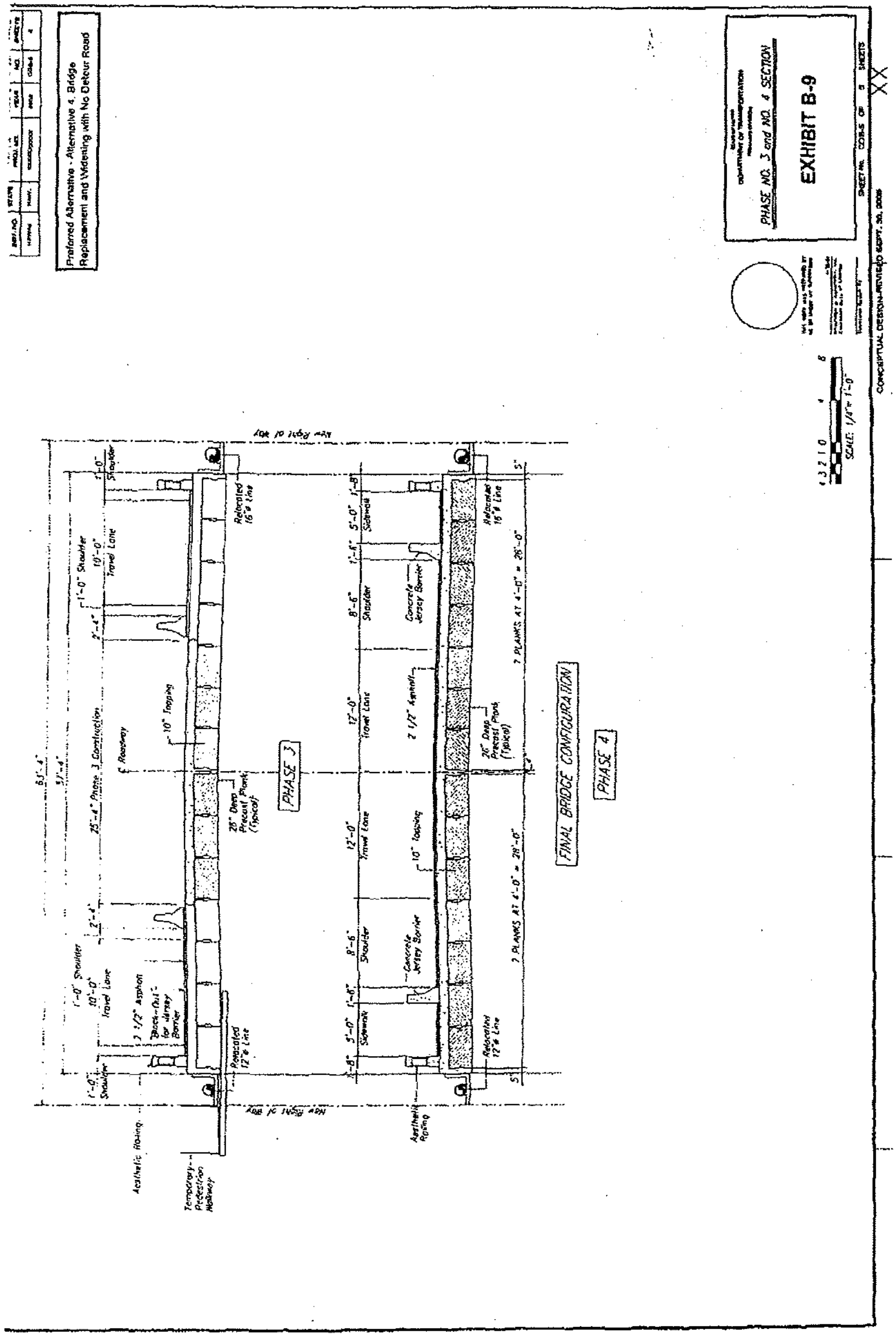

Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
PHASE NO. 3 and NO. 4 SECTION
EXHIBIT B-9
PHASE 3
FINAL BRIDGE CONFIGURATION
PHASE 4
Aesthetic Railing
Temporary Pedestrian Walkway
Concrete Jersey Barrier
26" Deep Precast Plank (Typical)
10" Topping
Travel Lane
Shoulder
Sidewalk
SCALE: 1/4" = 1'-0"
CONCEPTUAL DESIGN-REVISED SEPT. 30, 2005

EXHIBIT B-9

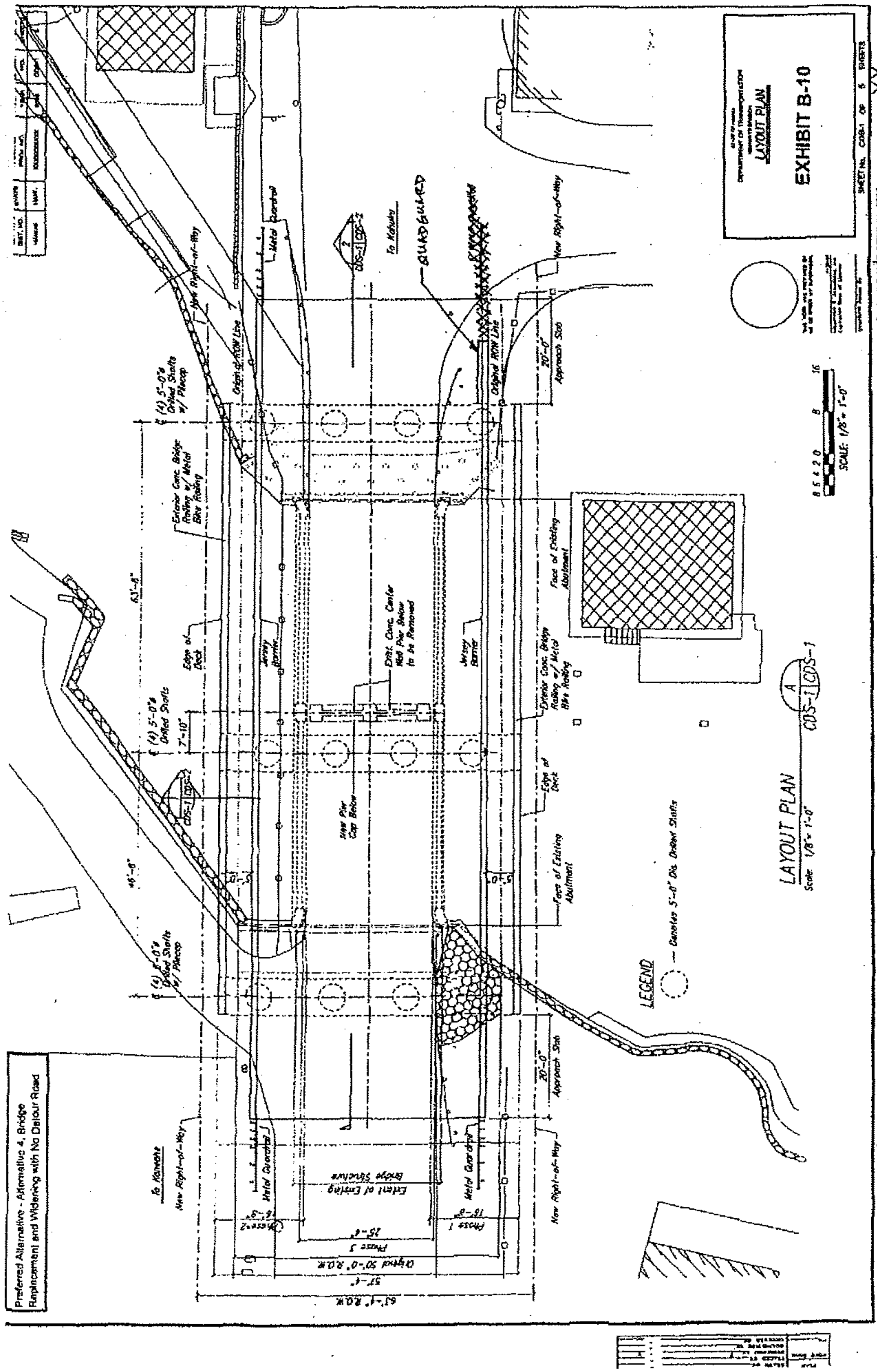

Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
LAYOUT PLAN
Scale 1/8" = 1'-0"
LEGEND
Denotes 5'-0" Dia. Drilled Shafts
EXHIBIT B-10
LAYOUT PLAN
SCALE: 1/8" = 1'-0"
CONCEPTUAL DESIGN-REVISED SEPT. 30, 2006
To Kahuku
To Kaneohe
New Right-of-Way
Approach Slab
Edge of Deck
Jersey Barrier
New Pier Cap Below
Face of Existing Abutment
GUARDGUARD

EXHIBIT B-10

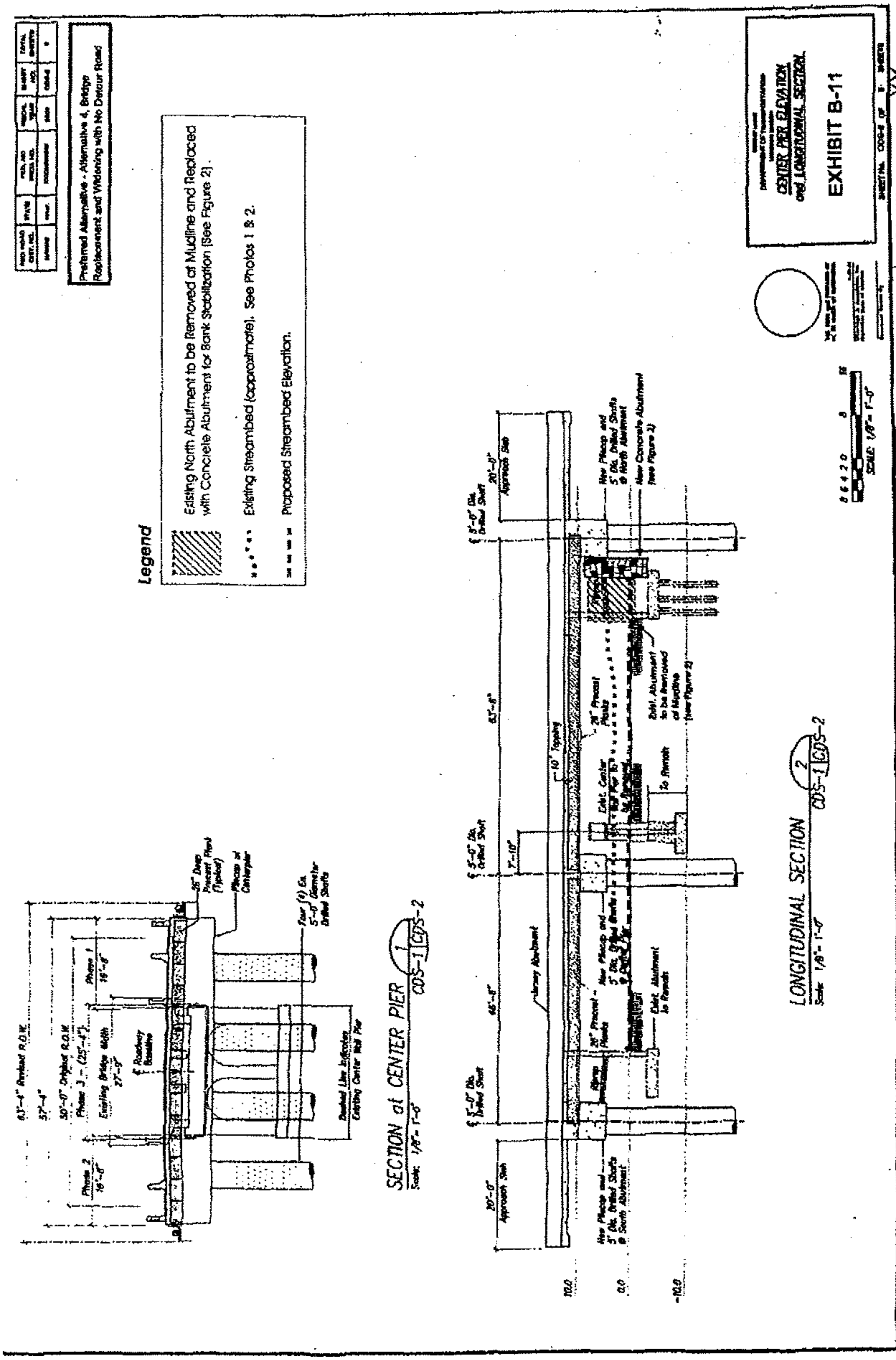

Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
Legend
Existing North Abutment to be Removed at Mudline and Replaced with Concrete Abutment for Bank Stabilization (See Figure 2).
Existing Streambed (approximate). See Photos 1 & 2.
Proposed Streambed Elevation.
CENTER PIER ELEVATION and LONGITUDINAL SECTION
EXHIBIT B-11
63'-4" Revised R.O.W.
57'-4"
50'-0" Original R.O.W.
Phase 3 - (25'-4")
Existing Bridge Width 27'-0"
Roadway Baseline
Phase 1 15'-8"
Phase 2 15'-8"
26" Deep Precast Plank (Typical)
Pilecap at Centerpier
Four (4) Ea. 5'-0" Diameter Drilled Shafts
Dashed Line Indicates Existing Center Wall Pier
SECTION at CENTER PIER
Scale: 1/8" = 1'-0"
5'-0" Dia. Drilled Shaft
20'-0" Approach Slab
45'-8"
7'-10"
10" Topping
63'-8"
Jersey Abutment
26" Precast Planks
New Pilecap and 5' Dia. Drilled Shafts @ South Abutment
New Pilecap and 5' Dia. Drilled Shafts @ Center Pier
New Pilecap and 5' Dia. Drilled Shafts @ North Abutment
Exist. Abutment to Remain
To Remain
Exist. Abutment to be Removed at Mudline (see Figure 2)
New Concrete Abutment (see Figure 2)
10.0
0.0
-10.0
LONGITUDINAL SECTION
Scale 1/8" = 1'-0"
SCALE 1/8" = 1'-0"

EXHIBIT B-11

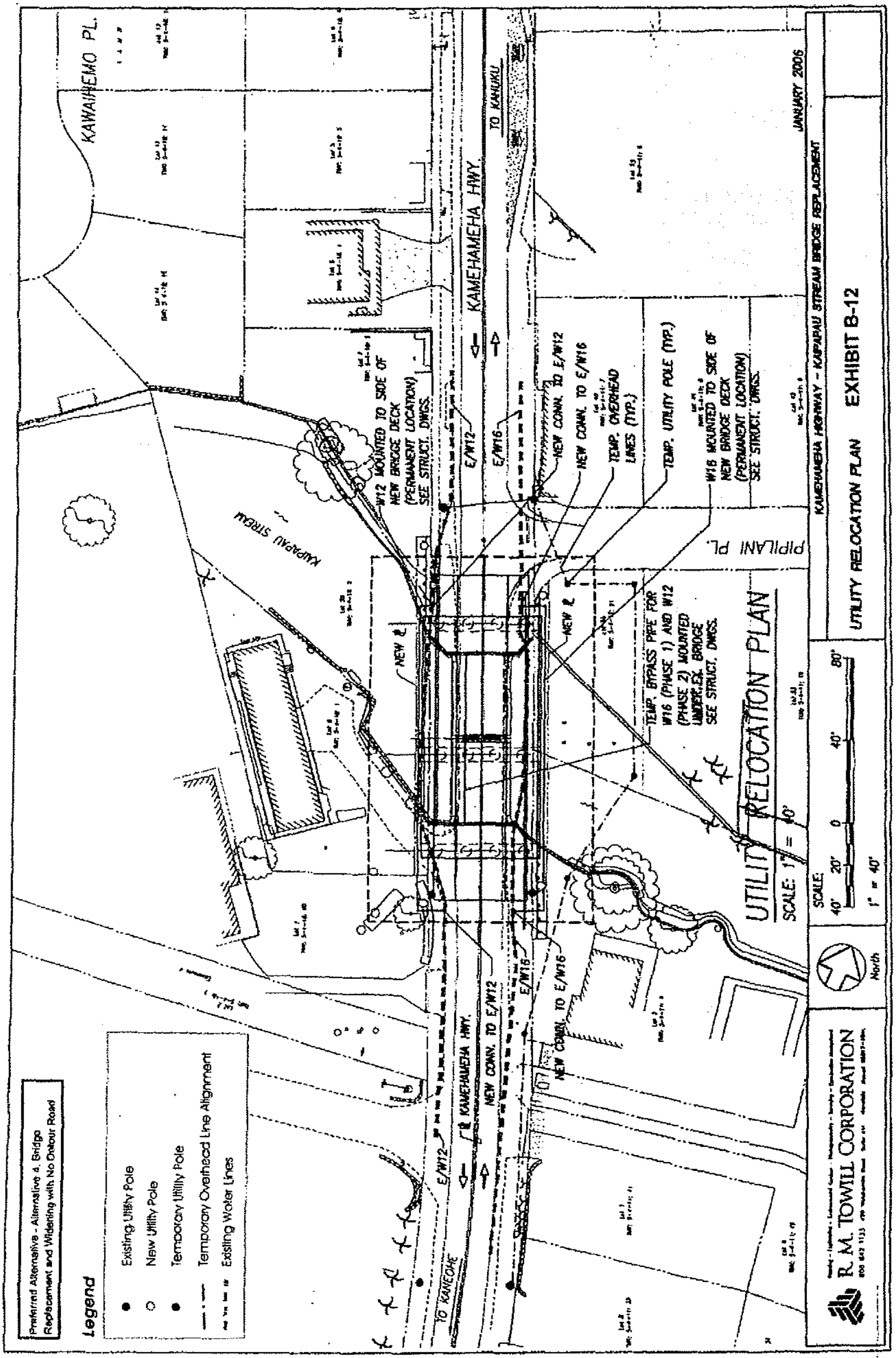

Preferred Alternative - Alternative 4, Bridge Replacement and Widening with No Detour Road
Legend
Existing Utility Pole
New Utility Pole
Temporary Utility Pole
Temporary Overhead Line Alignment
Existing Water Lines
KAWAIHEMO PL.
KAMEHAMEHA HWY.
TO KAHUKU
TO KANEOHE
KAPAPAU STREAM
PIPILANI PL.
W12 MOUNTED TO SIDE OF NEW BRIDGE DECK (PERMANENT LOCATION) SEE STRUCT. DWGS.
E/W12
E/W16
NEW CONN. TO E/W12
NEW CONN. TO E/W16
TEMP. OVERHEAD LINES (TYP.)
TEMP. UTILITY POLE (TYP.)
W16 MOUNTED TO SIDE OF NEW BRIDGE DECK (PERMANENT LOCATION) SEE STRUCT. DWGS.
NEW ℄
TEMP. BYPASS PIPE FOR W16 (PHASE 1) AND W12 (PHASE 2) MOUNTED UNDER EX. BRIDGE SEE STRUCT. DWGS.
UTILITY RELOCATION PLAN
SCALE: 1" = 40'
SCALE
40' 20' 0 40' 80'
1" = 40'
North
R. M. TOWILL CORPORATION
UTILITY RELOCATION PLAN
KAMEHAMEHA HIGHWAY - KAPAPAU STREAM BRIDGE REPLACEMENT
JANUARY 2006
EXHIBIT B-12

EXHIBIT B-12

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII
CERTIFICATE

RESOLUTION 07-278, CD1

Introduced: 09/04/07 By: BARBARA MARSHALL (BR) Committee: ZONING

Title: RESOLUTION GRANTING A SPECIAL MANAGEMENT AREA USE PERMIT FOR CONSTRUCTION OF A NEW BRIDGE OVER KAIPAPAU STREAM AT HAUULA, OAHU.

Links: RES07-278
RES07-278, CD1
D-669(07)

ZONING	09/25/07	CR-343 - RESOLUTION REPORTED OUT OF COMMITTEE FOR ADOPTION AS AMENDED IN CD1 FORM. (DEADLINE: 10/28/07)
COUNCIL	10/17/07	CR-343 AND RESOLUTION AS AMENDED (RES07-278, CD1) WERE ADOPTED.

APO	Y	CACHOLA	Y	DELA CRUZ	Y	DJOU	Y	GARCIA	Y
KOBAYASHI	Y	MARSHALL	Y	OKINO	Y	TAM	Y		

I hereby certify that the above is a true record of action by the Council of the City and County of Honolulu on this RESOLUTION.

for Bernice Mau
DENISE C. DE COSTA, CITY CLERK

Barbara Marshall
BARBARA MARSHALL, CHAIR AND PRESIDING OFFICER

Attachment 9

Categorical Exclusion Approval

Project Number BR-083-1(48)

State of Hawaii
Department of Transportation
Highways Division

DOCUMENTATION FOR CATEGORICAL EXCLUSIONS
LISTED UNDER 23 CFR §771.117(d)

Project Title: **KAIPAPAU STREAM BRIDGE REPLACEMENT (State Route 83)**

1) DESCRIPTION

Attach project location map and other appropriate graphics.

Estimated Project Cost ($mil) ROW: $ 0.33 CON: $ 11.55	*Project Length* 110 ft mi (___ km)	*Number of Lanes* Existing 2 Proposed 2
Design Speed 35 Existing 35 Proposed	*Functional Classification - 1= Principal Arterial, 2 = Minor Arterial, 3= Major Collector, 4= Minor Collector, 5= Local Road* 2 Existing 2 Proposed	*Proposed Typical Section* ☐ Rural ☒ Urban
Bridge ✗ Yes ☐ No	*Bridge Sufficiency Rating 35*	*Bridge ID:* 0033000830302099

Project Description:

The Kaipapa'u Stream Bridge is located on Kamehameha Highway, State Route 83, Hau'ula, Ko'olauloa, O'ahu. This project is one in a series of bridge replacements being implemented by the State Department of Transportation (SDOT-H) and Federal Highway Administration (FHWA) along the windward coast of O'ahu. Based on the current bridge replacement program of SDOT-H, the Kaipapa'u Stream Bridge facility has a National Bridge Inventory (NBI) rating of 37 based on a scale of 1-100. This NBI rating warrants rehabilitation or replacement of the bridge. Replacement and widening of the bridge will ensure that the structure meets Federal and State bridge and roadway standards. Proposed work includes construction to increase the dimensions of the bridge to approximately 110-foot long by 57-foot wide. The widened portions of the bridge will be constructed of prestressed concrete planks with cast-in-place bridge decks. The replacement bridge will also include bicycle and pedestrian facilities. Current standards for highway speed, loading, sight distances, guard railings, and other safety measures will be used in the design of the project.

2) ISSUES

Any response in a shaded box requires items 3 - 8 to be completed. Otherwise, skip to items 7 and 8.

	YES	NO
SOCIAL-ECONOMIC FACTORS		
A. General Economics - Adverse effects on the general economics of the community.		X

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	YES	NO
B. Community & Residential - Changes in the access controls along the length of the project.		X
C. Industrial & Commercial - Changes in the access controls along the length of the project.		X
D. Prime, Unique, Statewide, Local Important Farmland - Land on the Agricultural Lands of Importance for Hawaii Classification (ALISH) will be acquired.		X
E. Land Use/Urban Policy - ***Consistent*** with the local transportation improvement plans, land use plans and urban policy.	X	
F. Right-of-Way - Right of way that may be acquired by fee simple purchase, permanent or temporary easement, right of entry, gift, or other device are ***within*** the following limits: 1. <u>Resurfacing, Reconditioning, Restoration, Rehabilitation Projects</u>. a. Permanent - Less than one acre for any one mile (0.25 ha for any 1 km) b. Temporary - Less than 2 acres for any one mile (0.5 ha for any 1 km) 2. <u>Bridge Rehabilitation (including full deck replacement) or Minor Replacement</u> . Less than one half acre (0.2 ha) per bridge	N/A X	
- <u>Displacements</u> Residential, commercial, or industrial displacements. Vacant buildings which are not significant cultural resources may be acquired. See discussion of impacts and proposed mitigation in the Final EA, Section 5.2.	X	
G. Environmental Justice - Neither minority nor low-income populations ***will receive*** disproportionately high or adverse impacts as a result of the proposed project.	X	
NATURAL & PHYSICAL ENVIRONMENTAL FACTORS		
H. Wetlands - A Section 404 permit is required.		X
I. Flood Plains - Encroachment into a floodplain.	X	
J. Streams, Rivers, Shoreline Encroachments - A Section 404 permit is required. - ***Contradictory*** with the goals of the Coastal Zone Management Plan. - Use of lands, waters, or rivers designated as Wild/Scenic Rivers by the U.S. Government *(DOI National Park Service and/or US Fish & Wildlife Service)* - Permit required from the United States Coast Guard & Department of Accounting and General Services (DAGS).	X X	 X X
K. Rare, Threatened & Endangered Species - Adverse effects on rare, threatened, and endangered species or their habitat.		X

	YES	NO
L. Section 106, Historical & Cultural - Adverse effects to a significant cultural and/or historical resource. (*Cultural and historical resources are significant only if they are on or eligible for the National Register of Historic Places.*)	X	
M. Section 4(f) or 6(f) Properties - Acquisition of lands under the protection of Section 6(f) of the Land And Water Conservation Act of 1965. - Use of lands or other properties under the purview of Section 4(f) unless a Programmatic Section 4(f) approval has been made by the FHWA.		X X
N. Air Quality - Anticipate Carbon Monoxide levels that exceed 90% of the Federal standards of 9 ppm in 8 hours.		X
O. Noise Quality - A noise analysis is required per 23 CFR §772.5.		X
P. Hazardous Waste - Properties with hazardous waste will be acquired.		X
Q. Visual and Aesthetic - Adverse effect to view shed.		X

R. COMMENTS

3) **PURPOSE AND NEED**

Purpose and need of proposed action. Include description of existing facilities, abutting facilities, and how the action links into the overall transportation system. **When appropriate**, show that this project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

The Kaipapa'u Stream Bridge is located on Kamehameha Highway, State Route 83, Hau'ula, Ko'olauloa, O'ahu. State Route 83 is the only highway that provides access (for residents and commerce) to communities along the northern coast of O'ahu. This project is one in a series of bridge replacements being implemented by the State Department of Transportation (SDOT-H) and Federal Highway Administration (FHWA) along the windward coast of O'ahu. Based on the current bridge replacement program of SDOT-H, the Kaipapa'u Stream Bridge facility has a National Bridge Inventory (NBI) rating of 37 based on a scale of 1-100. This NBI rating warrants rehabilitation or replacement of the bridge in order to ensure continuous un-interrupted operations of goods and services. Replacement and widening of the bridge will ensure that the structure meets Federal and State bridge and roadway standards.

4) ALTERNATIVES

Summary of the alternatives considered and if they are not proposed for adoption, why not. (Identify which, if any, of the alternatives is the preferred alternative.)

The alternatives analysis for this project included the following approaches to addressing the deficiencies of the existing Kaipapa'u Stream Bridge:

- Alternative 1: No Action - no improvements to existing bridge.
- Alternative 2: Delayed Action - postponement of improvements for an indefinite period of time.
- Alternative 3: Rehabilitation of the Existing Bridge - repair of the existing bridge in place.
- Alternative 4: Bridge Replacement and Widening - No Detour Road: phased development to maintain two traffic lanes for the duration of the project.
- Alternative 5: Bridge Rehabilitation and Widening - No Detour Road: phased development to maintain two traffic lanes for the duration of the project.
- Alternative 6: Bridge Replacement - One-Lane Detour Road (Mauka):phased development with a one-lane detour road and a single traffic lane maintained on the existing bridge.
- Alternative 7: Bridge Replacement - Two-Lane Detour Road (Mauka): single phase with a two-lane detour road on the mauka side of the bridge that would provide two traffic lanes for the duration of the project.
- Alternative 8: Bridge Replacement - Two-Lane Detour Road (Makai): single phase with a two-lane detour road on the makai side of the bridge that would provide two traffic lanes for the duration of the project.

Based on the comparison of alternatives and evaluation of the information presented in the Final EA, Sections 2.7 through 2.11, Alternative 4 is the preferred alternative for the following reasons:

- Lowest vehicle user cost of all the alternatives
- Least ROW acquisition required of all the alternatives
- Least land disturbance

5) PUBLIC INVOLVEMENT

Briefly summarize the status and results of public involvement. Include the dates and results of coordination with local units of government, if any.

Public involvement in the subject project included: formal agency and public consultation, a public informational meeting, and public hearings held by governmental agencies for specific aspects of the project.

Public and Agency Consultation

- Review of Draft EA – 30 day comments period between Nov. 8 and Dec. 10, 2006. 23 agencies and/or individual were provided with an opportunity to comment on the project. 12 comments were received.
- Presentation to Ko'olauloa Neighborhood Board, Sept. 6, 2006
- Public Informational Meeting, August 6, 2006
- Agency Consultation regarding: Section 106, NHPA; Section 4(f), DOT; Section 107, ESA; Section 9, USGS; Section 401, CWA; Section 404, CWA; and Section 10, RHA.

6) **IMPACTS**

Provide a description of the impacts. Also attach coordination and concurrence letters requested (See *Instructions for Categorical Exclusions*, page 4). If the coordination letters are not attached, provide information on what coordination has taken place.

Summary of Impact, Proposed Mitigation, and Consultation:

Potential Impact & Issues	Proposed Mitigation	Consultation
Right-of-way acquisition	Additional 13 feet of ROW required requiring the acquisition of a single family home. Displacement and relocation assistance to be provided in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended.	Land owner consulted and advised of dislocation and relocation assistance
Flood Plain Encroachment	The bridge is in flood zone AE where base flood elevation is 10-14 feet.	None
Section 404 Permit	Permit pending Corps of Engineers decision pending public review after February 1, 2010.	ACOE determination attached
U.S. Coast Guard Permit	Communications from DOT-H to USCG requesting comments, April 20, 2007	USCG 'no comment' response October 12, 2007
Historic Preservation	Final Section 106, NHPA, decision pending final review of archaeological monitoring (January 2010)	SHPD determination attached July 2006 and May 2007
Section 4f	No impacts identified	Consultation letter attached
Section 6 (LWCF)	No impacts identified	None
Coastal Zone Management Federal Consistency Review	Coordination with State Office of Planning, October 2008	Office of Planning response November 2008.
Section 401 (CWA) Certification	Application filed:	Permit pending
Storm-water run-off	Application filed: January 2010	Permit pending
Endangered Species	No impacts anticipated	NMFS May 2007, DLNR April 2007

7) DETERMINATION

☒ Categorical Exclusion
It is determined, after review of this document, and coordination with other agencies, that this project was demonstrated that no significant environmental effects will result.

☐ Environmental Assessment (EA) / Environmental Impact Statement (EIS)
It is determined, after review of this document, and coordination with other agencies, that further study is required to determine if there will be significant environmental consequences. An Environmental Assessment is required.

8) SIGNATURES

Prepared By:

2/1/10
Date

Project Manager
Hawaii Department of Transportation

Approved By:

FEB 2 2010
Date

Chief, Highways Division
Hawaii Department of Transportation

2/5/10
Date

Federal Highway Administration
Transportation Engineer

FORM CATEX-HI
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Attachment F

USACE Revised Nationwide Permit Verification for Kaipapa‘u Stream Bridge Replacement Project – POH-2005-00342

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

September 19, 2014

SUBJECT: Revised Nationwide Permit Verification for
Kaipapa'u Stream Bridge Replacement Project – POH-2005-00342

Mr. Glenn Okimoto
Department of Transportation, Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Okimoto:

The U.S. Army Corps of Engineers, Honolulu District, has completed its review of your request for authorization dated March 24, 2014 for the proposed Kaipapa'u Stream Bridge Replacement Project – POH-2005-00342 on Kamehameha Highway, near mile marker 21, in Hau'ula, Oahu, Hawaii. This office has verified that your proposed activity complies with the terms and conditions of Nationwide Permit #3 (Maintenance Activities), Nationwide Permit #14 (Linear Transportation Projects) and the overall Nationwide Permit Program issued on March 17, 2012. Please reference file number POH-2005-00342 in any future correspondence relating to this permit.

This NWP verification is being issued pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and/or Section 404 of the Clean Water Act (Section 404) authorizing the following work as described below and as depicted on the enclosed drawings (Enclosure 1):

> The proposed project originally did not include the temporary detour bridge and was previously authorized on April 19, 2010. The authorization expired with the expiration of the 2012 Nationwide Permits and was not constructed. The project was then revised and a new application was submitted to the Corps on March 25, 2014. The proposed project includes replacing the existing bridge with a new bridge that will be 110 feet long by 57 feet wide. The new bridge includes 6 drilled shafts that will be located outside of the Ordinary High Water Mark (OHWM) and Mean Higher High Water mark (MHHW). One existing concrete center wall pier located below MHHW will be removed as part of the project. The project will also involve maintenance dredging of five cubic yards below MHHW to remove accumulated sediment and debris. Temporary fill includes the placement of sand bags to redirect the stream during construction, with 25 CY of fill placed within the MHHW and 5 CY of fill placed within the OHWM. Temporary concrete footing for the detour bridge will include 1 CY of fill below MWWH. The

temporary detour bridge will removed entirely once the project has been constructed.

In order for this NWP authorization to be valid, you must ensure that the work is performed in accordance with the *Nationwide Permit General Conditions* (Enclosure 2), the *Honolulu District Regional Conditions* (Enclosure 3), and the following project-specific Special Conditions:

1. Photographic documentation of the existing bridge acceptable to the SHPD shall be completed prior to start of the bridge replacement work.

2. Archaeological monitoring of the bridge replacement work shall be conducted during ground disturbing activities in accordance with the SHPD-accepted archaeological monitoring plan.

3. In-stream work will during the low rainfall season, and during fair weather conditions.

4. You understand and agree that, if future operations by the United States require the removal, relocation, or other alteration, of the nourished beach herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said nourished beach shall cause unreasonable obstruction to the free navigation of the navigable waters, you will be required, upon due notice from this office, to remove, relocate, or alter the nourished beach or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

5. You must comply with the attached Pacific Standard Local Operating Procedure for Endangered Species (Pac-SLOPES) general conditions, special conditions, and activity-specific best management practices (BMPs) to avoid effects to threatened or endangered marine species (Enclosure 4).

Our verification of this NWP authorization is valid until **March 18, 2017** unless this NWP is modified, reissued, or revoked prior to that date. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act. This authorization does not relieve you of the responsibility to obtain any other Federal, State, and/or local authorizations required by law.

We have prepared and enclosed a *Preliminary Jurisdictional Determination* (JD) (Enclosure 5), which is a written indication that wetlands and waterways within your project area may be waters of the United States. Such waters will be treated as jurisdictional waters of the U.S. for purposes of computation of impact area and compensatory mitigation requirements associated with your permit application. If you believe the Preliminary JD is inaccurate, you may request an Approved JD, which is an official determination regarding the presence or absence of waters of the U.S. If you choose to request an Approved JD, please be aware that we may require the submittal of additional information and work authorized in this letter may <u>not</u> occur until the approved JD has been finalized.

Finally, General Condition #30 requires a signed certification be submitted to this office upon completion of work. Therefore, please sign, date and return the enclosed *Compliance Certification* form (Enclosure 6) within 7 days of completion of work to CEPOH-RO@usace.army.mil.

Thank you for your cooperation with the Honolulu District Regulatory Program. Should you have any questions, please contact Ms. Shelly Lynch at 808-832-4300 or via e-mail at Michelle.R.Lynch@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Office by accessing our web-based customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0. Please reference file number **POH-2005-00342** in any future correspondence relating to this permit.

Sincerely,

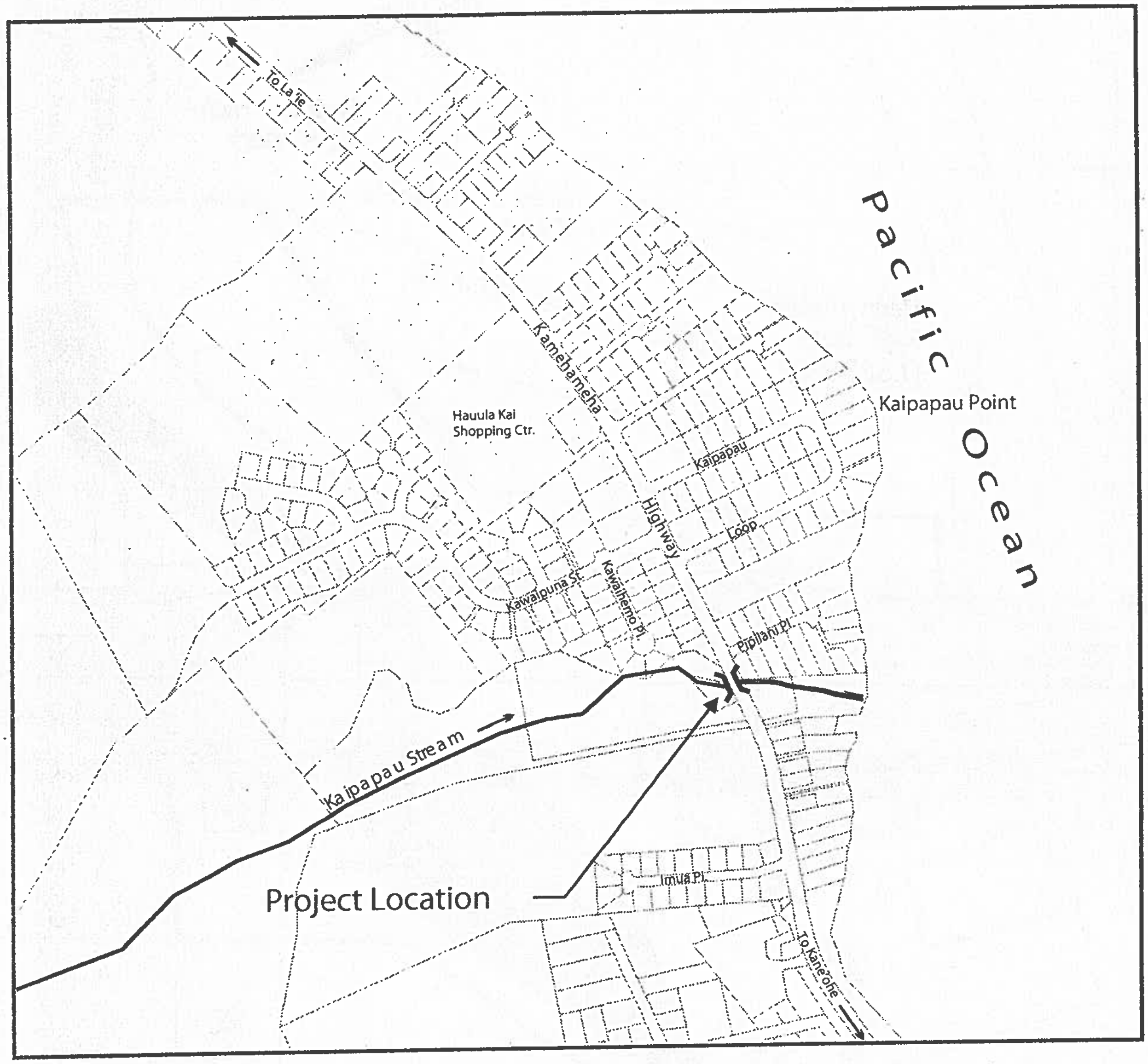
Kate Bliss

Kate Bliss
Acting Chief, Regulatory Office

Enclosure(s)

cc:

R.M. Towill Corporation (Koga)
State of Hawaii DBEDT Office of Planning (Nakagawa)
State of Hawaii DOH-CWB (Lum)



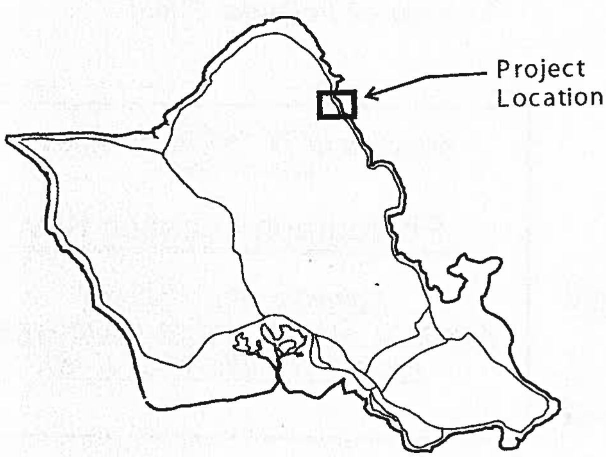


FIGURE 1
PROJECT LOCATION
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

0 1000 Feet 2000

R. M. TOWILL CORPORATION October 2013

2012 NATIONWIDE PERMIT GENERAL CONDITIONS

As excerpted from the *Federal Register* /Vol. 77, No. 34 /Tuesday, February 21, 2012 /Notices pp. 10282-10287

1. *Navigation.*

(a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. *Aquatic Life Movements.*
No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. *Spawning Areas.*
Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. *Migratory Bird Breeding Areas.*
Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. *Shellfish Beds.*
No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. *Suitable Material.*
No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

15. *Single and Complete Project.*
The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. *Wild and Scenic Rivers.*
No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. *Tribal Rights.*
No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. *Endangered Species.*
(a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps 'determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the preconstruction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete preconstruction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h–2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2)–(14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, and ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water

27. *Regional and Case-By-Case Conditions.*
The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. *Use of Multiple Nationwide Permits.*
The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. *Transfer of Nationwide Permit Verifications.*
If the permittee sells the property associated with nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature: "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below:

____

(Transferee) (Date)

30. *Compliance Certification.*
Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) *Form of Pre-Construction Notification:* The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in

2012 NATIONWIDE PERMIT HONOLULU DISTRICT REGIONAL CONDITIONS

Honolulu District has adopted the following Regional Conditions as a means to ensure no more than minimal impacts, on an individual and/or cumulative basis, will occur in waters of the United States by projects authorized by Nationwide Permit (NWP). The following Regional Conditions are applicable unless the Honolulu District makes a written determination, based on project-specific information, that omitting or deviating from a particular Regional Condition is both merited and would not result in more than minimal impacts to the aquatic environment.

Coral Reef Advisory: Please be advised that coral reefs are special aquatic sites with complex ecosystems that may consist of many contributing biological assemblages, including sponges, macroalgae, seagrass, soft corals, gorgonians, etc., in addition to reef-building coral colonies. It should not be assumed that low live coral cover or the absence of live coral colonies in a particular sample or location indicates the absence of potential impacts to a coral reef by a given project. The Honolulu District determines, after coordinating with the appropriate resource agencies, the presence and magnitude of impacts to coral reef special aquatic sites, as well as appropriate and practicable compensatory mitigation requirements, commensurate with the scope and scale of specific authorized activities.

Regional Condition 1 – Exclusions

1. **Revoked Permits.**

The following NWPs may not be used to authorize activities within the geographic areas subject to the regulatory jurisdiction of the Honolulu District:

NWP 21 - Surface Coal Mining Activities
NWP 24 - Indian Tribe or State Administered Section 404 Programs
NWP 29 - Residential Developments
NWP 34 - Cranberry Production Activities
NWP 39 - Commercial and Institutional Developments
NWP 42 - Recreational Activities
NWP 44 - Mining Activities
NWP 49 - Coal Remining Activities
NWP 50 - Underground Coal Mining Activities
NWP 52 - Water-Based Renewable Energy Generation Pilot Projects

2. **Kihei Wetlands**.

The following NWPs may not be used to authorize activities on the island of Maui, Hawaii, within the area bounded by Mokulele Highway to the north, Kilohana Drive to the south, Piilani Highway to the east, and extending to the Pacific Ocean to the west:

NWP 12 - Utility Line Activities
NWP 13 - Bank Stabilization
NWP 14 - Linear Transportation Projects
NWP 18 - Minor Discharges
NWP 19 - Minor Dredging
NWP 33 - Temporary Construction, Access, and Dewatering
NWP 40 - Agricultural Activities
NWP 41 - Reshaping Existing Drainage Ditches
NWP 43 - Stormwater Management Facilities

6. **Coral Reefs**.

No activity that directly results in a permanent loss of coral reef may be authorized by NWP if the District Engineer determines, after coordinating with appropriate resource agencies, that compensatory mitigation is required.

7. **Stream Modification**.

The following NWPs may not be used to authorize permanent stream channelization or the construction of dams that impound waters of the United States:

NWP 7 - Outfall Structures and Associated Intake Structures
NWP 12 - Utility Line Activities
NWP 14 - Linear Transportation Projects
NWP 18 - Minor Discharges
NWP 25 - Structural Discharges
NWP 40 - Agricultural Activities
NWP 41 - Reshaping Existing Drainage Ditches
NWP 51 - Land-Based Renewable Energy Generation Facilities

Regional Condition 2 – Regional Conditions that apply to all NWPs in the Honolulu District

1. **Pre-Construction Notification (PCN)**.

Notification to the Honolulu District is required, in accordance with General Condition 31, for any activity authorized by NWP that will take place within any of the geographic areas subject to the regulatory jurisdiction of the Honolulu District. You must obtain a written NWP verification from the Honolulu District before commencing the authorized activity.

2. **Compensatory Mitigation**.

Upland vegetation buffers may not be used as the primary or sole method to offset permanent losses of wetland or aquatic resources within the geographic areas subject

4. **Site Identification**

Prior to clearing and construction, project limits of authorized sites must be clearly identified in the field (e.g., by staking, flagging, silt fencing, buoys, existing footprint for maintenance activities, etc.) to ensure that impacts to waters of the United States (including wetlands) beyond project footprints are avoided. Such identification of project limits must be properly maintained until construction is completed and the soils have been stabilized.

5. **Protected or Endangered Species**

a. Constant vigilance shall be kept for the presence of protected species during all aspects of the proposed action. Protected species include plants and animals listed or proposed for listing as threatened or endangered under Endangered Species Act (ESA), birds covered under the Migratory Bird Conservation Act, as well as all marine mammals. Although the protected species potentially affected would be determined on a project-specific basis, protected species typically of concern in Hawaii include: Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, Hawaiian duck, Hawaiian goose, green sea turtle, hawksbill sea turtle, and Hawaiian monk seal. In the Territory of Guam or the Commonwealth of the Northern Mariana Islands species include: nightingale wee-warbler, Mariana common moorhen, green sea turtle, and hawksbill sea turtle. In American Samoa species also include: green sea turtle and hawksbill sea turtle.

b. All on-site project personnel, irrespective of their employment arrangement or affiliation (e.g. employee, contractor, etc.), shall be apprised of the status of any protected species potentially present in the project area and the protections afforded to those species under Federal laws. Brochures explaining the laws and guidelines for listed species in Hawaii, American Samoa, and Guam may be downloaded from http://www.nmfs.noaa.gov/prot_res/MMWatch/hawaii.htm and http://www.fws.gov/pacificislands/species.html.

c. The project foreman shall designate an appropriate number of competent observers to survey the area adjacent to the proposed action for protected species. The project foreman shall also have in his/her possession at the jobsite a handout with photographs of protected species that may enter the construction site to assist with identification of the protected species. (U.S. Fish and Wildlife Service – Pacific Islands Fish and Wildlife Office (PIFWO) will provide the informational handout).

d. Surveys of the project area shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one half hour, to ensure that no protected species are in the project area (typically within 50 yards of the proposed work). All work shall be postponed or halted when protected species are present, and shall only begin/resume after the animals have voluntarily departed the area. In the case of sessile species, a

c. To the extent practicable, work in the aquatic environment must be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods. Coordination with federal resource agencies (U.S. Fish and Wildlife Service and/or NOAA) can assist in identifying these time periods.

d. Dredging and filling in the aquatic environment must be designed to avoid or minimize adverse impacts to or the loss of special aquatic sites (wetlands (swamps, marshes, bogs, etc.), mudflats, vegetated shallows/seagrass beds, coral reefs and/or riffle and pool complexes).

e. All project-related materials (fill, landscaping, etc.) and equipment (dredges, barges, backhoes, etc.) to be placed in any aquatic environment shall be inspected and cleaned of pollutants, organic matter, and invasive species (including snakes, frogs, and marine plants and animals, etc.) prior to use in any aquatic environment.

f. No project-related materials (fill, revetment rock, pipe etc.) shall be stockpiled in the aquatic environment (intertidal zones, reef flats, stream channels, wetlands etc.) or in close proximity such that materials could be carried into waters by wind, rain, or high surf.

g. All construction debris and material removed from the marine/aquatic environment shall be disposed of at an approved upland or alternative disposal site.

h. No contamination (by trash, debris, sediment, non-native species introductions, attractions of non-native pests, etc.) of adjacent waters of the United States, including special aquatic sites, shall result from project-related activities. Special attention must be paid to the fouling level on barges, vessels, and equipment whereas to minimize the transport and potential introduction and spread of aquatic non-native species. In addition, if dredged or excavated material or structural members are removed from the water or placed in the water, measures must be taken to prevent the spread or introduction of any aquatic non-native species. This shall be accomplished by implementing a litter-control plan and on a site or project specific need basis, 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.

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

1899, any best management practices (BMPs) required or recommended by the DOH for purposes of avoiding and minimizing the discharge of pollutants, other than dredged or fill material, into state waters, including 303(d)-listed impaired waters, are hereby incorporated into the NWP verification. These conditions are subject to discretionary enforcement by the Honolulu District.

c. For projects directly impacting "Impaired Waters" as listed on the most recent CWA Section 303(d) list (*http://hawaii.gov/health/environmental/water/cleanwater/integrated/index.html*), the PCN shall:

(1) Identify the waterbody as an "Impaired Water" and,

(2) Identify mitigating measures or BMPs necessary to avoid further degradation of the impaired water.

d. You may dispose of dredged spoils at state permitted landfills, provided you comply with the landfill's acceptance criteria. Preapproval by the DOH-Solid and Hazardous Waste Branch is not required for this action. The generator shall provide documentation to DOH upon request. You may use dredge spoils at off-site locations, provided the dredged spoils meet the Hawaii DOH Soil Environmental Action Levels for unrestricted use. You must adequately characterize the dredged spoils, including conducting sampling and analysis in accordance with the HEER Office Technical Guidance Manual and other relevant guidance documents. Sampling methodology and analytical results shall be documented, including a comparison to EALs, and maintained by the generator. The spoils shall also meet the definition of inert fill material, which generally includes "...earth, soil, rocks, and rock-like materials... [that do not] contain vegetation or other organic material, or other solid waste." The generator shall provide the documentation to the DOH upon request. Offsite placement of dredged spoils that do not meet the above criteria or occur without adequate records may be considered illegal dumping, subject to enforcement action.

Regional Condition 3 – Acreage Limitation

The maximum acreage loss of waters of the United States for the total project may not exceed 1/10-acre resulting from any discharge of dredged or fill material in a special aquatic site, including wetlands, if authorized by the following NWPs, or a combination of any of these NWPs:

NWP 3 - Maintenance
NWP 7 - Outfall Structures and Associated Intake Structures
NWP 40 - Agricultural Activities
NWP 41 - Reshaping Existing Drainage Ditches
NWP 43 - Stormwater Management Facilities
NWP 45 - Repair of Uplands Damaged by Discrete Events

measures must be incorporated to prevent perching of the culvert or scouring that could obstruct up- and downstream native stream species migration. To preserve a natural stream bed, bridge designs that span the stream or river, including pier or pile supported spans, are encouraged.

Regional Condition 7 – Bank Stabilization.

Vertical walls and/or non permeable rigid structures such as pre-cast concrete, concrete rubble masonry, and cast-in-place structures may not be used for bank stabilization authorized under the following NWPs:

NWP 13 - Bank Stabilization
NWP 14 - Linear Transportation Projects
NWP 27 - Aquatic Habitat Restoration, Establishment, and Enhancement Activities
NWP 45 - Repair of Uplands Damaged by Discrete Events

Regional Condition 8 - Mooring Buoys.

Within 7 days of installation of a mooring buoy authorized by NWP 10, you must provide the as-built coordinates of its location to the Honolulu District and the U.S. Coast Guard.

Regional Condition 9 – Runways and Taxiways.

NWP 14 may not be used to authorize runways or taxiways.

Pac-SLOPES General Conditions

GENERAL CONDITIONS: The Corps will apply the following set of general conditions to each action authorized under Pac-SLOPES. Additionally, specific BMPs described in section 5 under the specific activity types will be required as applicable.

1. Each applicable condition, BMP, and conservation measure will be included as an enforceable part of the permit document.

2. The Corps will retain the right of reasonable access to projects authorized under Pac-SLOPES to monitor the compliance with and effectiveness of permit conditions.

3. Each permit will contain the requirement that the permittee document and report to the Corps and NMFS, all interactions with listed species, including the disposition of any listed species that are injured or killed. Should an ESA-listed species be adversely affected, all work must stop pending reinitiation of consultation between the Corps and NMFS PRD for that action.

4. Constant vigilance shall be kept for the presence of ESA-listed marine species during all aspects of a proposed action

a) A responsible party, i.e., permittee/site manager/project supervisor, shall designate a competent observer to survey work sites and the areas adjacent to the proposed action for ESA-listed marine species;

b) Surveys shall be made prior to the start of work each day, including prior to resumption of work following any break of more than one half hour. Periodic additional surveys throughout the work day are strongly recommended;

c) All in-water work will be postponed or halted when ESA-listed marine species are within 50 yards of the proposed work, and will only begin/resume after the animals have voluntarily departed the area, with the following exception: if ESA-listed marine species are noticed within 50 yards after work has already begun, that work may continue only if, in the best judgment of the responsible party, the activity is unlikely disturb or harm the animal(s), for example, divers performing surveys or underwater work (excluding the use of toxic chemicals) is likely safe, the use of heavy machinery is not; and

d) No one shall attempt to feed, touch, ride, or otherwise intentionally interact with any protected species.

5. Project footprints must be limited to the minimum area necessary to complete the project.

6. The project area must be flagged to identify sensitive resource areas, such as seagrass beds, listed terrestrial plants, and turtle nests.

access routes must be utilized or improved whenever possible, in lieu of construction of new access routes.

13. All disturbed areas must be immediately stabilized following cessation of activities for any break in work longer than 4 days.

14. Drilling and sampling are restricted to uncontaminated areas, and any associated waste or spoils must be completely isolated and disposed of in an upland location.

15. Authorized work must comply with all applicable NWP General and Regional Conditions.

Pac-SLOPES SPECIAL CONDITIONS

In addition to the general conditions listed the following special conditions are required under Pac-SLOPES for each activity:

2.2.6 Maintenance Dredging

1. With the exception of the actual dredging apparatus (e.g. clamshell buckets, or the scoop and articulated arm of a backhoe, etc.), heavy equipment will be operated from above and out of the water;
2. The portions of the equipment that enter the water will be clean and free of pollutants;
3. Appropriate silt containment devices must be used and properly installed to avoid degradation of adjacent coral reefs, and aquatic vegetation; and
4. Dredged material must be deposited at upland sites, or at EPA designated ocean disposal sites provided sediment standards are met.
5. Dredging of coral reefs, sites that support submerged aquatic vegetation (including sites where submerged aquatic vegetation is documented to exist but may not be present in a given year), and wetlands, is not authorized;
6. Use of hydraulic dredging (aka vacuum, suction, hopper) is not authorized;
7. Any form of blasting is not authorized; and
8. Any dredging for the purpose of connecting canals or other artificial waterways to navigable waters is not authorized.

2.2.12 Road Construction, Repair, and Improvement

1. Maximum road width shall be limited to the minimum width necessary;
2. Roads shall be designed and constructed in a manner that minimizes adverse impacts on surface and marine waters due to runoff and erosion;
3. Roads shall be constructed as near as possible to pre-construction contours and elevations; and
4. Roads must be bridged or culverted in a manner that maintains surface flows with minimal modification to flow direction or velocity.

2.2.13 Bridge Repair & Replacement

1. Temporary fills must consist of stable materials, and be placed in a manner, that will not be eroded by expected high flows;
2. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations within 30 days of project completion; and
3. Installation of pilings, including steel sheetpile cofferdams, is expressly excluded from coverage under Pac-SLOPES, as is any in-water drilling.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there "*may be*" waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

A. REPORT COMPLETION DATE: September 3, 2014

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD: Mr. Glenn Okimoto Department of Transportation, Highways Division, 869 Punchbowl Street, Honolulu, Hawaii 96813

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: POH, Kaipapa'u Stream Bridge Replacement Project, POH-2005-00342

D. PROJECT LOCATION(S), BACKGROUND INFORMATION, AND WATERS:

State: Hawaii
Island: Oahu
City: Hau'ula
County: Honolulu
Name of nearest waterbody: Kaipapa'u Stream

Identify amount of waters in the review area:
Name of any water bodies on the site that have been identified as Section 10 waters:
Tidal: 554 feet of Kaipapa'u Stream is tidally influenced.
Non-Tidal: 306 feet of Kaipapa'u Stream is non-tidal.

Waters of the U.S.

Waterbody	Latitude (dd.ddd °N)	Longitude (dd.ddd °W)	Cowardin Class	Area (Acres)	Length (Feet)	Width (Feet)
Kaipapa'u Stream	21°37'02"	157°54'50"	E1UBL	0.38	554	30
Kaipapa'u Stream			R3UBH	0.21	306	30

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: September 3, 2014
☐ Field Determination. Date(s):

G. EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

COMPLIANCE CERTIFICATION

PERMIT NO.: POH-2005-00342, Kaipapa'u Stream Bridge Replacement Project

DATE OF VERIFICATION: September 5, 2014

DATE VERIFICATION EXPIRES: March 18, 2017

NAME OF PERMITTEE: Mr. Glenn Okimoto, Department of Transportation, Highways Division, 869 Punchbowl Street, Honolulu, Hawaii 96813

In accordance with General Condition #30, the permittee must, upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Honolulu District
Attn: CEPOH-EC-R, Regulatory Branch
Building 230
Fort Shafter, Hawaii 96858-5440

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of this permit, you are subject to permit suspension, modification or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

____
Signature of Permittee

____
Date

Attachment G

Final Environmental Assessment

Appendix A	**Traditional Cultural Practices Assessment**
Appendix B	**Botanical Resources Study**
Appendix C	**Noise Impact Assessment**
Appendix D	**Water Quality and Biological Reconnaissance Surveys of Lower Kaipapa‘u Stream**
Appendix E	**SHPD Correspondence**
Appendix F	**Public Consultation**

LINDA LINGLE
GOVERNOR

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3695

RECEIVED
'07 FEB 26 P3:01
OFC. OF ENVIRONMENTAL QUALITY CONTROL

FEB 23 2007

TO: GENEVIEVE K. Y. SALMONSON, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: BRENNON T. MORIOKA, Ph.D., P.E.
DEPUTY DIRECTOR-HIGHWAYS

SUBJECT: FINDING OF NO SIGNIFICANT IMPACT (FONSI) AND FINAL ENVIRONMENTAL ASSESSMENT (FEA)
KAMEHAMEHA HIGHWAY KAIPAPAU STREAM BRIDGE REPLACEMENT
FEDERAL-AID PROJECT NO. BR-083-1(48)

The Hawaii Department of Transportation (HDOT) has reviewed the comments received during the 30-day public comment period which began November 8, 2006, and believes the mitigation measures proposed in the Final EA adequately addresses the issues raised. Concerns regarding traffic, water quality, construction practices, stream construction activities, and drainage are addressed in the Final EA. No other significant concerns were raised during the public review period.

Best Management Practices and mitigation measures described in the Final EA will ensure that no significant negative impacts to urban lands, water and air quality, flora and fauna, cultural and scenic resources, land use, or community well-being will result from the proposed project. The proposed action will further benefit the motoring public by providing a safe and functional new bridge by replacing the currently substandard bridge with one that meets Federal and State standards.

HDOT hereby issues this finding of no significant impact. Please publish this notice in the March 8, 2007, *Environmental Notice*. We have enclosed a completed OEQC Environmental Notice Publication Form, two hard copies of the Final EA, and one CD of the project in pdf format. Please contact Li Nah Okita at 692-7581 or Duane Taniguchi at 692-7582, if you have any questions and reference HWY-DD 2.3695 as noted above.

Enclosure

DT/RMT:rva
bc: HWY-DD(LNO)
FHWA(EW)
c: R. M. Towill (Walter Chong)

Final Environmental Assessment

Kaipapa‘u Stream Bridge Replacement

State Route 83, Kamehameha Highway

PROJECT NO. BR-083-1(48)

DISTRICT OF KO‘OLAULOA, O‘AHU, HAWAI‘I

Prepared For:

State of Hawai‘i
Department of Transportation
Highways Division

Prepared By:

R.M. Towill Corporation
Honolulu, Hawai‘i
1-19548-0P

February 2007

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PROJECT SUMMARY

Project:	Kaipapaʻu Stream Bridge Replacement Federal Aid Project No. BR-083-1(48)
Applicant:	State of Hawaiʻi, Department of Transportation, Highways Division
Accepting Authority:	State of Hawaiʻi, Department of Transportation
Tax Map Key: (TMK)	Adjacent to Plats (1) 5-4-011 and 018. Roadways and bridges are not assigned TMK numbers.
Location:	Kamehameha Highway (State Route 83) at Kaipapaʻu Stream, Hauʻula, Koʻolauloa District, Island of Oʻahu
Project Area:	1.3 acres (includes bridge, roadway approaches, construction access and adjacent staging areas)
Agent:	R. M. Towill Corporation 420 Waiakamilo Road, Suite 411 Honolulu, Hawaiʻi 96817 Attn: Chester Koga, AICP Phone: (808) 842-1133 Facsimile: (808) 842-1937
Existing Land Use:	State Highway and Bridge
Proposed Action:	Replace and widen the highway bridge at Kaipapaʻu Stream on Kamehameha Highway, State Route 83. Construct wider travel lanes, shoulders, ADA-compliant pedestrian walkway/bicycling facilities, reinforced guardrails, and drainage features. Construct improvements to approach roads with retaining walls.
Anticipated Permit Requirements	Section 404 Department of the Army Nationwide Permit # 33, "Temporary Construction, Access, and Dewatering;" Section 401 Water Quality Certification; Stream Channel Alteration Permit; Coastal Zone Management Federal Consistency Review; NPDES Notice of Intent for Storm Water, Hydrotesting and Dewatering during Construction; Special Management Area Permit; and Right-of-Entry from private land owners.

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CHAPTER 1

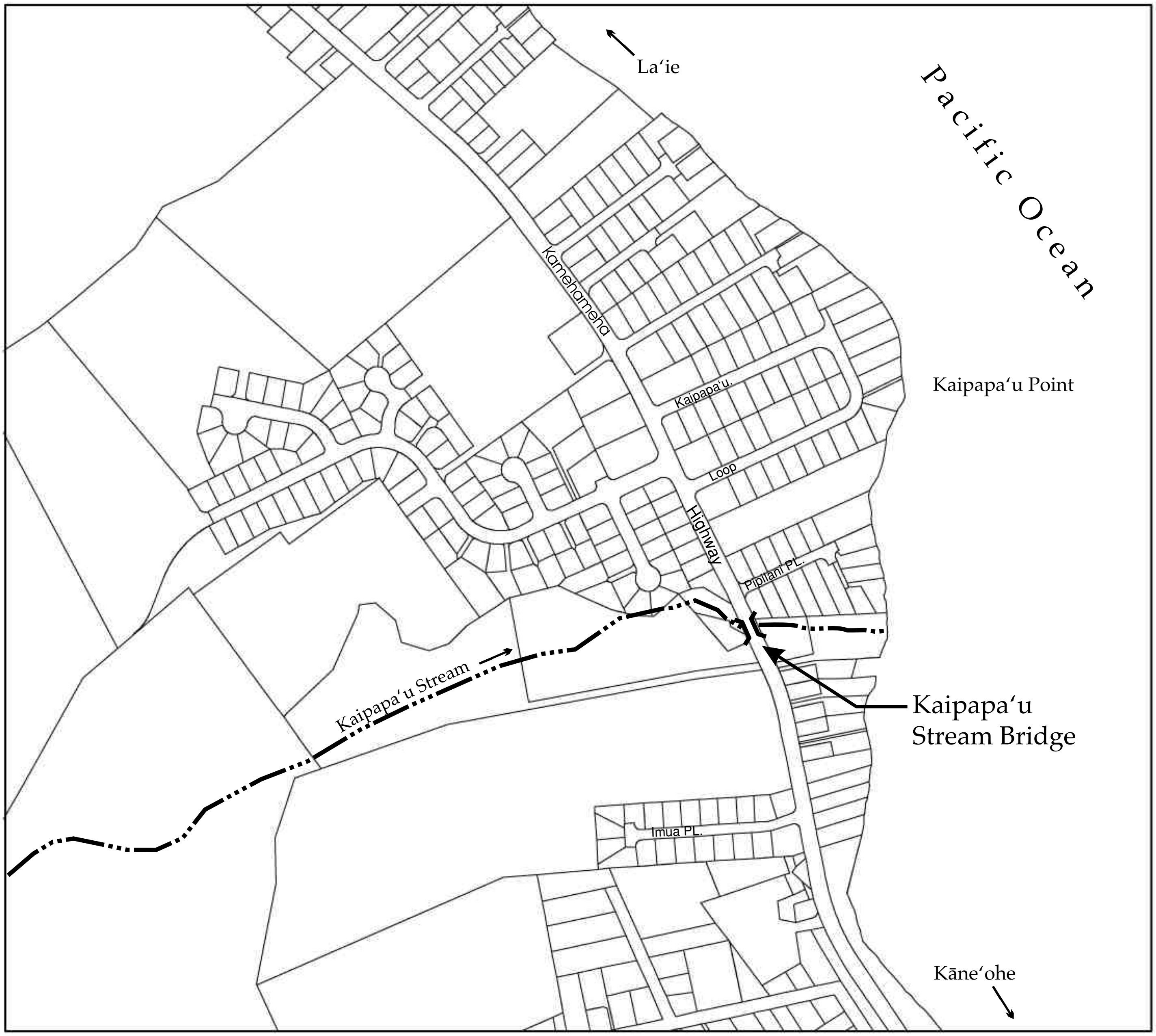
INTRODUCTION

1.1 PROJECT OVERVIEW

The Kaipapaʻu Stream Bridge is located on Kamehameha Highway, State Route 83, Hauʻula, Koʻolauloa, Oʻahu **(Figure 1, Project Location and Vicinity Map)**. This project is one in a series of bridge replacements being implemented by the State Department of Transportation (SDOT-H) and Federal Highway Administration (FHWA) along the windward coast of Oʻahu. Replacement and widening of the bridge will ensure that the structure meets Federal and State bridge and roadway standards.

SDOT-H is mandated to maintain the functional and structural integrity of bridges on State roadways. The fulfillment of this mandate requires SDOT-H to conduct regular inspections of bridges within its jurisdiction and make recommendations to modify or replace structurally deficient bridges to meet current standards for roadway widths and safety features as specified by the American Association of State Highway and Transportation Officials (AASHTO) and SDOT-H design criteria. Based on the current bridge replacement program of SDOT-H, the Kaipapaʻu Stream Bridge is listed in the National Bridge Inventory (NBI) and has a rating of 37 (based on a scale of 1-100) and warrants rehabilitation or replacement. Its structure number is 0033000830302099.

Proposed work includes construction to increase the dimensions of the bridge to approximately 110-foot long by 57-foot wide. The widened portions of the bridge will be constructed of prestressed concrete planks with cast-in-place bridge decks. The replacement bridge will also include bicycle and pedestrian facilities. Current standards for highway speed, loading, sight distances, guard railings, and other safety measures will be used in the design of the project.



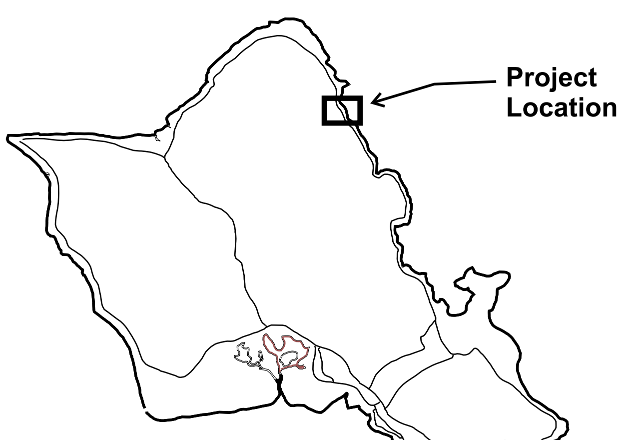


FIGURE 1
PROJECT LOCATION & VICINITY MAP
Kaipapaʻu Stream Bridge Replacement
Koʻolauloa District, Oʻahu, Hawaiʻi

0 500 1000 Feet

R. M. TOWILL CORPORATION February 2007

1.2 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

This project is subject to preparation of environmental documentation in compliance with requirements of Chapter 200, Title 11, Hawaiʻi Administrative Rules (HAR), Chapter 343, Hawaiʻi Revised Statutes (HRS), and the National Environmental Policy Act (NEPA) because State of Hawaiʻi and Federal (FHWA) funds will be used for development. The requirements for the NEPA will be handled through the filing of a Documentation for Categorical Exclusions listed under Title 23 of the Code of Federal Regulations, Section 771.117(d).

A Draft Environmental Assessment (EA) was published for public review in the November 8, 2006 issue of the State Department of Health (DOH), Office of Environmental Quality Control (OEQC), Environmental Notice. Comments were received during the public comment period (see **Appendix F - Public Consultation**).

This Final EA provides additional information based on the comments received that further describes the proposed project, the environmental conditions of the site, the potential for significant adverse impacts, and the application of mitigation measures as appropriate, to reduce the potential for significant environmental impacts.

The Final EA and accompanying Finding of No Significant Impact (FONSI) will be filed with the Office of Environmental Quality Control (OEQC) by SDOT-H.

1.3 PURPOSE AND NEED FOR PROJECT

SDOT-H is mandated to maintain the functional and structural integrity of bridges on State roadways. Based on the current bridge replacement program of SDOT-H, the Kaipapaʻu Stream Bridge facility has a National Bridge Inventory (NBI) rating of 37 based on a scale of 1-100. This NBI rating warrants rehabilitation or replacement of the bridge. This proposed bridge project is needed to mitigate bridge maintenance concerns, increase traffic safety (for motorists and pedestrians) and meet the projected vehicle usage of the Kamehameha Highway.

CHAPTER 2

ALTERNATIVES TO THE PROPOSED ACTION

2.1 OVERVIEW OF ALTERNATIVES

The alternatives analysis for this project included the following approaches to addressing the deficiencies of the existing Kaipapaʻu Stream Bridge:

- Alternative 1: No Action - no improvements to existing bridge.
- Alternative 2: Delayed Action - postponement of improvements for an indefinite period of time.
- Alternative 3: Rehabilitation of the Existing Bridge - repair of the existing bridge in place.
- Alternative 4: Bridge Replacement and Widening - No Detour Road: phased development to maintain two traffic lanes for the duration of the project.
- Alternative 5: Bridge Rehabilitation and Widening - No Detour Road: phased development to maintain two traffic lanes for the duration of the project.
- Alternative 6: Bridge Replacement - One-Lane Detour Road (Mauka) :phased development with a one-lane detour road and a single traffic lane maintained on the existing bridge.
- Alternative 7: Bridge Replacement - Two-Lane Detour Road (Mauka): single phase with a two-lane detour road on the mauka side of the bridge that would provide two traffic lanes for the duration of the project.
- Alternative 8: Bridge Replacement - Two-Lane Detour Road (Makai): single phase with a two-lane detour road on the makai side of the bridge that would provide two traffic lanes for the duration of the project.

2.2 ALTERNATIVES REJECTED

Alternatives 1, 2 and 3 do not meet the most critical criterion: meeting Federal and State standards. Additional considerations also supported rejection of these alternatives, as discussed below.

- *Alternative 1 - No Action*

  The no-action alternative would result in no effort to repair or replace the bridge to meet current safety standards. Under this option, environmental impacts resulting from bridge replacement activities would be averted, and bridge replacement costs would be spared. However, the bridge would continue to deteriorate, requiring regular inspection and increasing maintenance to maximize its useful lifespan. Eventually, the bridge may no longer provide a safe support for vehicle traffic and could face closure.

- *Alternative 2 - Delayed Action*

  Under this alternative, the existing Kaipapa'u Stream Bridge would continue to be used for an undefined period. Regular inspections and maintenance to prolong the useful life of the Kaipapa'u Stream Bridge would continue to be performed by SDOT-H until a future decision is made to undertake the replacement project. Under this alternative, resource expenditures for bridge replacement would be averted in the short-term. However, project activities would ultimately incur higher development cost due to inflation while generating environmental outcomes similar to other alternatives for immediate action.

- *Alternative 3 - Bridge Rehabilitation of Existing Bridge*

  This alternative would result in extensive replacement of elements of the bridge superstructure and substructure, including steel girders, timber beams and braces. Existing concrete girders would be strengthened by adding stirrups and bottom beam reinforcement with six inches of concrete. Additional supports and reinforcements might also be required, particularly to the bridge railings which do not meet currently acceptable safety standards (SDOT-H Bridge Inspection Report, October 1997).

This alternative to only rehabilitate the existing bridge would result in less construction and right-of-way impacts to the surrounding residences at the Kaipapa'u Stream Bridge crossing. Federal funds however would not be available for bridge improvements because only rehabilitating the existing bridge would not result in conformance to federal standards for bridge design and highway safety. Therefore, the entire cost of renovation and maintenance would have to be borne by the State.

This alternative would also increase the depth of the bridge girders, which would reduce the volume of water that passes under the bridge.

2.3 EVALUATIVE CRITERIA FOR REMAINING ALTERNATIVES

The following criteria were utilized to compare the feasibility, benefits, and relative impacts of the remaining four project alternatives (Section 2.1, Alternative # 4, 5, 6, 7 and 8). Each criterion and its application to the remaining alternatives has been addressed in the following sections:

2.4 *Highway and Bridge Standards* - This involves criteria to meet both Federal and State standards for highways and bridges.

2.5 *Dwelling Demolition and Resident Relocation Requirements* - This is to determine the extent to which nearby single-family residences and their occupants will be affected by construction, including requirements to demolish dwellings and temporarily or permanently relocate current residents from the project area.

2.6 *Complexity of Utility Relocation* - This involves and examination of the relative difficulty of replacing existing utilities such as overhead electrical lines and water lines.

2.7 *Site Distance* - This criteria evaluates the degree to which visibility for drivers will be impaired by various construction alternatives.

2.8 *Traffic Control -* This examines the impact and cost of keeping traffic moving through the bridge area before and during construction.

2.9 *Construction Duration* - This criteria compares alternatives based on estimated elapsed construction time. Alternatives are likely to be similar with regard to the amount of time it may take to make arrangements for right-of-entry to private properties as well as residential demolition and relocation arrangements.

2.10 *Pedestrian Access During Construction -* This examines the ability of pedestrians to traverse the bridge during construction.

2.11 *Alternative Comparison -* This estimates and compares construction costs, ROW purchase costs, and vehicular user costs between alternatives.

2.4 HIGHWAY AND BRIDGE STANDARDS

The purpose of this project is to rehabilitate or replace and widen the existing Kaipapa‘u Stream Bridge to meet all current Federal and State bridge and roadway standards. These include, but are not limited to, regulations for roadway sections (lane widths, pedestrian and bicycle facilities, and shoulders), seismic strength, guardrails, and the Americans with Disabilities Act. Alternatives 4 through 8 meet this central criterion and were evaluated using additional criteria to select the preferred alternative for the project.

2.5 DWELLING DEMOLITION AND RESIDENT RELOCATION REQUIREMENTS

The proposed project will require removal of single family residences in the immediate area. The number of dwellings requiring removal varies from 2 to 7. Demolition of private residences and relocation will have cost consequences, as owners will be compensated for their loss of property. Preliminary right of way costs were estimated for the alternatives. The most expensive alternative from this perspective is Alternative 7: Bridge Replacement - Two-Lane Detour Road (Mauka), estimated at $2.3 million. Alternative 4: Bridge Replacement and Widening - No Detour Road and

Alternative 5: Bridge Rehabilitation and Widening - No Detour Road were the least expensive with an estimated cost of $0.33 million. **Table 1, Summary of Demolition and Relocation Requirements** provides an overview.

Table 1

Summary of Demolition and Relocation Requirements

Alternative No.		Dwellings Requiring Demolition	Temporary Relocation of Residents	Right-Of-Way (ROW) Costs ($ in Millions)
4	Bridge Replacement and Widening - No Detour Road	1	3	$0.33
5	Bridge Rehabilitation and Widening - No Detour Road	1	3	$0.33
6	Bridge Replacement - One-Lane Detour Road (Mauka)	6	2	$1.7
7	Bridge Replacement - Two-Lane Detour Road (Mauka)	7	3	$2.3
8	Bridge Replacement - Two-Lane Detour Road (Makai)	7	1	$1.9

Below is a list of properties that may be affected as a result of the construction activities in Alternatives 4 through 8. (The specific properties that will be affected by the preferred alternative are discussed in more detail in **Section 5.2 Demolition of Residences and Relocation Requirements**):

- TMK: 5-4-11:04 (makai-Kāneʻohe side of bridge)
- TMK: 5-4-11:21 (makai-Kahuku side of bridge)
- TMK: 5-4-11:06 (makai-Kahuku side of bridge)
- TMK: 5-4-11:07 (makai-Kahuku side of bridge)
- TMK: 5-4-18:01 (mauka-Kāneʻohe side of bridge)
- TMK: 5-4-18:02 (mauka-Kāneʻohe side of bridge)
- TMK: 5-4-18:03 (mauka-Kahuku side of bridge)
- TMK: 5-4-18:04 (mauka-Kahuku side of bridge)
- TMK: 5-4-18:05 (mauka-Kahuku side of bridge)

2.6 TRAFFIC CONTROL REQUIREMENTS

Traffic control requirements for alternatives 4 through 8 will include use of arrow boards, signs or other traffic control devices to identify detours and notify motorists of ongoing construction activities. The speed limit within the project area and on the detour roads will be limited to 25 miles per hour during construction for Alternatives 4 and 5. Alternatives 6, 7 and 8 will have a speed limit of 15 miles per hour to minimize right-of-way requirements for the detour roads.

- ***Alternative 4: Bridge Replacement and Widening - No Detour Road***

  Of the five alternatives, Alternative 4 will have the least impact on vehicular traffic because it has the shortest estimated construction period of approximately 16 months. Project phasing will allow for the construction of the mauka and makai bridge expansions while maintaining both lanes on the existing bridge to be open to traffic. Work completed on the mauka and makai expansions will then be utilized to accommodate traffic in both directions, while the existing bridge structure is replaced.

- ***Alternative 5: Bridge Rehabilitation and Widening - No Detour Road***

  Alternative 5 will have the second shortest estimated construction period of approximately 18 months. Project phasing will also allow for the construction of the mauka and makai bridge expansions while maintaining both lanes on the existing bridge to be open to traffic. Work completed on the mauka and makai expansions will then be utilized to accommodate traffic in both directions, while the existing bridge structure is rehabilitated.

- ***Alternative 6: Bridge Replacement - One-Lane Detour Road (Mauka)***

  Under this alternative, there will be two through lanes available at all times. However, because construction of the new bridge must accommodate a traffic lane, the duration of the bridge construction will be approximately 22 months.

- *Alternative 7: Bridge Replacement - Two-Lane Detour Road (Mauka) and Alternative 8: Bridge Replacement - Two-Lane Detour Road (Makai)*

  Alternatives 7 and 8 will have less impact on vehicular traffic than alternative 6. Under these scenarios, there will be two through lanes available at all times. Because traffic will be redirected away from the bridge site onto the detour road, the duration of the bridge construction can proceed in a single phase and can be completed in approximately 17 months.

2.6.1 Construction Sequencing and Traffic Control Requirements

This section provides details of the relationship between construction sequencing among the alternatives and the associated requirements for traffic control. Traffic controls are in *italics*.

Alternative 4: Bridge Replacement and Widening - No Detour Road

<u>Phase 1</u>

Construct 16'-8" section on the makai side of the existing bridge. This section provides the pedestrian walkway used during construction in Phase 2. Work includes:

- *Maintain two 10-foot wide vehicle travel lanes with 1'-0" shoulders on the existing bridge.*
- Construct 5'-0" diameter drilled shafts, one beyond each abutment and one adjacent to the center pier at the makai side of the existing bridge. Partially demolish abutment wing walls as required for the installation of prestressed planks.
- Construct abutments, piercaps, prestressed planks, etc., with construction joints short of the existing bridge with provisions to "tie-in" at the final stage of construction.
- Construct approach slabs within the limits of Phase 1 construction.
- Construct wall makai of bridge for slope protection (location to be determined during design).
- Provide slope protection (rip-rap or CRM) at the abutment walls as required. **See Figure 2, Alternative 4, Site Plan.**

<u>Phase 2</u>

Construct 16'-8" section on the mauka side of the existing bridge. Work includes:

- *Maintain one 11-foot wide vehicle travel lanes with 1'-0" shoulders on the existing bridge and a 5'-0" wide pedestrian walkway and the existing bridge and one 10-foot wide vehicle travel lane with 1'-0" shoulders on the Phase 1 constructed deck.*

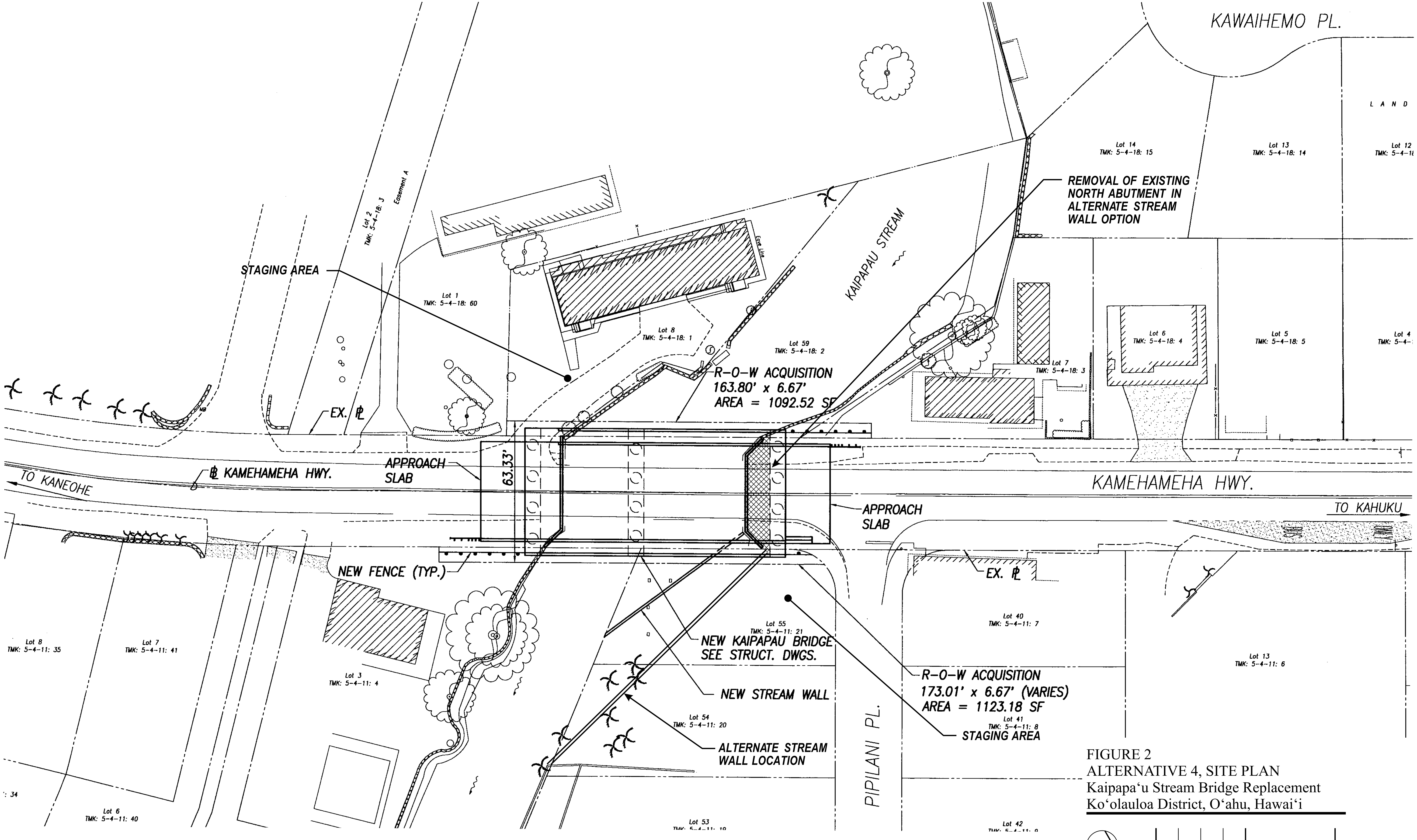


FIGURE 2
ALTERNATIVE 4, SITE PLAN
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

R. M. TOWILL CORPORATION February 2007

Note:
See Table 3 for Sight Distance Concerns

- Demolish the existing pedestrian walkway at the mauka side of existing bridge.
- Construct 5'-0" diameter drilled shafts, one beyond each abutment and one adjacent to the center pier at the mauka side of existing bridge. Partially demolish abutment wing walls as required for the installation of prestressed planks.
- Construct abutments, piercaps, prestressed planks, etc., with construction joints short of the existing bridge with provisions to "tie-in" at the final stage of construction.
- Construct approach slabs within the limits of Phase 2 construction.
- Provide slope protection (rip-rap or CRM) at the abutment walls as required.

Phase 3

In this phase, the balance of the existing bridge is demolished and vehicle travel is temporarily detoured to the newly constructed Phase 1 and 2 sections. The remainder of the new bridge will be constructed in this Phase. A temporary pedestrian walkway will also be provided on the mauka side of the bridge. Work includes:

- *Relocate one 10-foot wide vehicle travel lane with 1'-0" shoulders to the Phase 2 constructed deck while maintaining the temporary makai travel lane and shoulders constructed in Phase 1.*
- Construct a temporary pedestrian walkway at the mauka side of the bridge.
- Remove the balance of the existing bridge deck and center pier as required while maintaining portions of the existing abutments.
- Construct two new 5'-0" diameter drilled shaft at interior of each new abutment and center pier.
- Construct piercaps and tie-in to the newly constructed Phase 1 and 2 abutments and center pier.
- Construct balance of bridge structure between the Phase 1 and 2 widening sections.
- Construct approach slabs.

Phase 4

This phase prepares the bridge for its final configuration. Work includes:

- *Construct new jersey barriers, complete asphalt pavement and realign the road travel lanes.*
- Remove temporary pedestrian walkway.

Alternative 5: Bridge Rehabilitation and Widening - No Detour Road

Phase 1

Construct 10'-3" section on the makai side of the existing bridge. This section provides the pedestrian walkway used during construction in Phase 2. Work includes:

- *Maintain two 11-foot wide vehicle travel lanes with 1'-0" shoulders on the existing bridge.*
- Construct 5'-0" diameter drilled shafts, one at each abutment and two at the center pier at the makai side of existing bridge. Demolish abutment footings and provide sheet piling as required for the installation of drilled shafts at the abutments.
- Construct abutments, piers, caps, girders, etc., with construction joints short of the existing bridge with provisions to "tie-in" at the final stage of construction.
- Construct approach slabs within the limits of Phase 1 construction.
- Construct wall makai of bridge for slope protection (location to be determined during design).
- Reconstruct wing walls and provide slope protection (rip-rap or CRM wall as required). **See Figure 3, Alternative 5, Site Plan.**

Phase 2

Construct 10'-3" section on the mauka side of the existing bridge. This section provides the pedestrian walkway used during construction in Phase 3. Work includes:

- *Maintain two 11-foot wide vehicle travel lanes with 1'-0" shoulders on the existing bridge.*
- Demolish the existing pedestrian walkway at the mauka side of existing bridge.
- Construct 5'-0" diameter drilled shafts, one at each abutment and two at the center pier at the mauka side of existing bridge. Demolish abutment footings and provide sheet piling as required for the installation of drilled shafts at the abutments.
- Construct abutments, piers, caps, girders, etc., with construction joints short of the existing bridge with provisions to "tie-in" at the final stage of construction.
- Construct approach slabs within the limits of Phase 2 construction.
- Reconstruct wing walls and provide slope protection (rip-rap or CRM wall as required).

Phase 3

The duration of this phase is relatively short and provides the necessary vehicle travel widths and pedestrian walkway for construction in Phase 4. Work includes:

- *Reduce vehicle travel lanes to 10'-0" wide each with 1'-0" shoulders.*
- Remove the existing concrete railing at the makai side of the existing bridge.

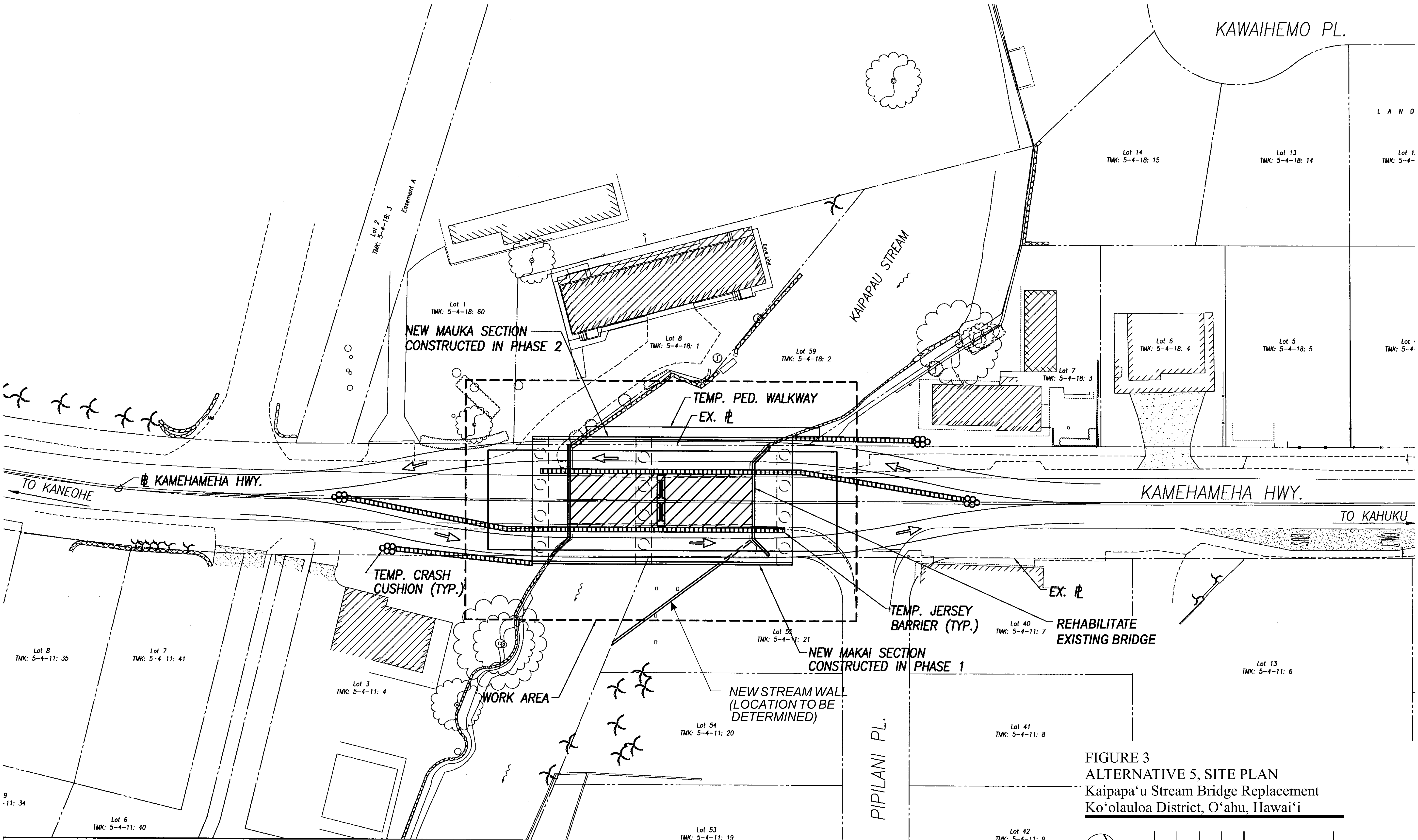


FIGURE 3
ALTERNATIVE 5, SITE PLAN
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

R. M. TOWILL CORPORATION February 2007

Note:
See Table 3 for Sight Distance Concerns

Phase 4

Shift the vehicle travel lanes and pedestrian walkway to the makai side of the bridge allowing the new bridge deck at the mauka side to be "tied-in" with the existing bridge. In addition, strengthen the mauka existing girder. Work includes:

- *Shift the two 11-foot wide vehicle travel lanes with 1'-0" shoulders and a 5-foot walkway to the makai side of the bridge.*
- Provide metal plates throughout bridge at the makai side and "blend-in" asphalt topping for smooth riding surface. The existing bridge has a 3"± thick layer of asphalt atop of the existing structural concrete deck.
- Remove portion of existing bridge at the mauka side of the exterior girder and prepare for the "tie-in" to the new portion of bridge.
- Strengthen mauka existing girder by adding stirrups and bottom beam reinforcing with 6"± concrete each side of beam. Shore existing exterior girder and chip out bottom to provide for new bottom reinforcing. Existing girder shall be intentionally roughened prior to pouring of concrete encasement around existing girder.
- Construct "tie-in" to existing bridge deck at the mauka side of the existing bridge.

Phase 5

Shift the vehicle travel lanes and pedestrian walkway to the mauka side of the bridge allowing the new bridge deck at the makai side to be "tied-in" with the existing bridge. In addition, strengthen the makai existing girder. Work includes:

- *Shift the two 11-foot wide vehicle travel lanes with 1'-0" shoulders and a 5-foot walkway to the mauka side of the bridge.*
- Remove portion of existing bridge at the makai side of the exterior girder and prepare for the "tie-in" to the new portion of bridge.
- Strengthen makai existing girder by adding stirrups and bottom beam reinforcing with 6"± concrete each side of beam. Shore existing exterior girder and chip out bottom to provide for new bottom reinforcing. Existing girder shall be intentionally roughened prior to pouring of a concrete encasement around existing girder.
- Construct "tie-in" to existing bridge deck at the makai side of the existing bridge.

Phase 6

This phase allows the remainder of the existing bridge to be strengthened while the vehicle travel lanes are situated at each side of the bridge. A temporary pedestrian walkway will also be provided. Work includes:

- *Provide two 11-foot wide vehicle travel lanes with 10" shoulders at each side of the existing bridge.*
- Construct a temporary pedestrian walkway at the mauka side of the bridge.

- Construct two new 5'-0" diameter drilled shaft at interior of each the abutments. Shafts shall be constructed thru the existing abutment foundation.
- Construct piercap and tie-in to the newly constructed widening of abutment at each end of the bridge structure.
- Construct approach slabs within the limits of Phase 6 construction.
- Strengthen the existing interior two girders by intentionally roughening the beam and providing stirrups and bottom reinforcing with 6"± concrete encasement each side and at the bottom of the existing girder.
- Remove existing asphalt, roughen existing surface of the concrete bridge deck and provide negative reinforcement at the center pier as well and transverse reinforcement for the deck slab with an additional 6"± of topping to make the bridge continuous and monolithic.

Phase 7

This phase prepares the bridge for its final configuration. Work includes:

- *Construct new jersey barriers and realign the road travel lanes and shoulder widths.*
- Remove temporary pedestrian walkway.

Alternative 6: Bridge Replacement - One-Lane Detour Road (Mauka)

Phase 1

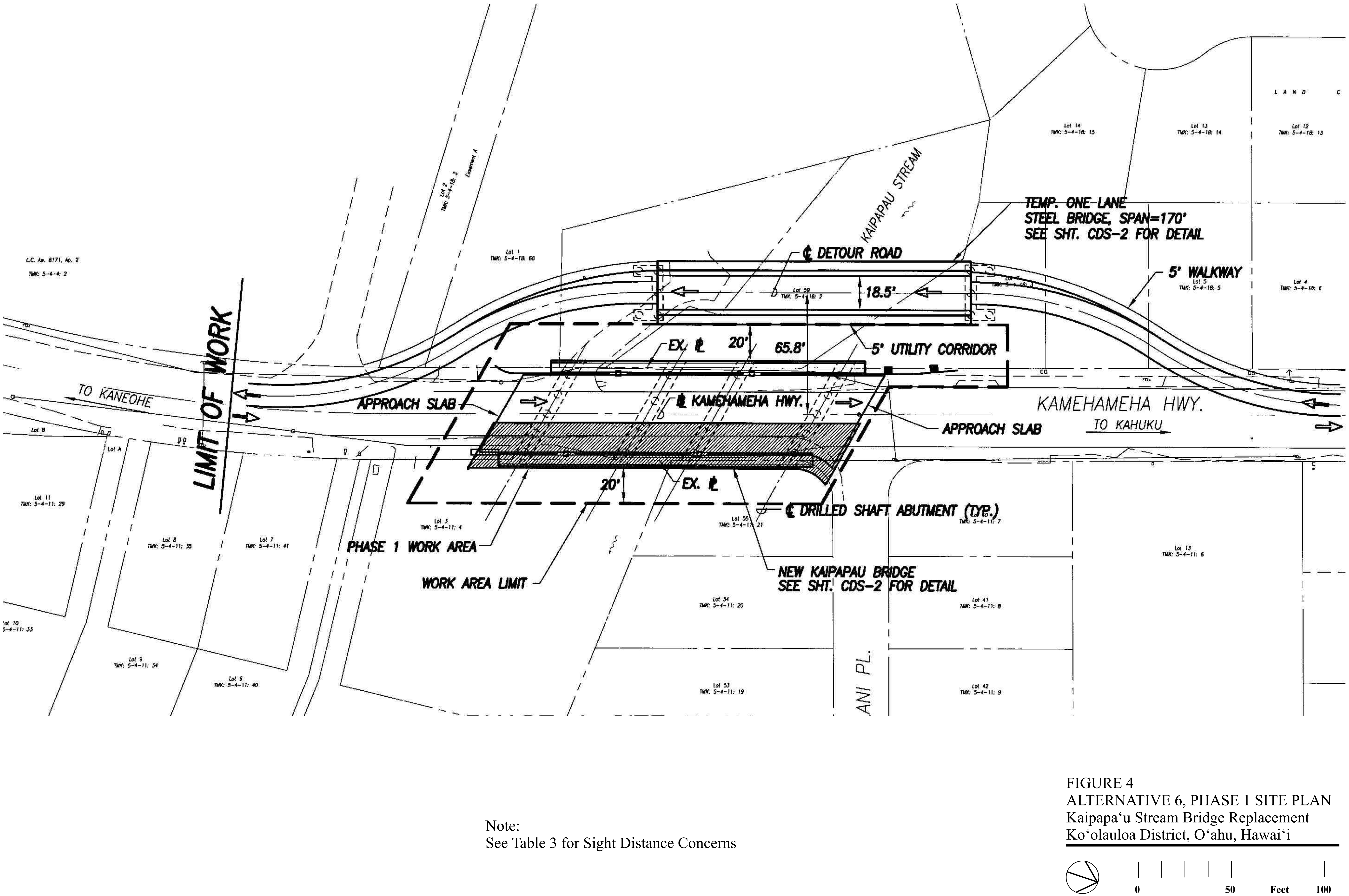
This phase allows for the construction of the mauka detour road and the demolition and reconstruction of the makai side of the bridge. Work includes:

- *Construct a single lane detour road on the mauka side of the existing bridge.* Locate the detour road to provide a minimum of 20 feet of horizontal clearance between the detour road and the new bridge. The makai side of the existing bridge. Demolish and reconstruct the makai side of the bridge.
- *Maintain a single lane of traffic on the mauka side of the existing bridge for Kahuku-bound traffic.* Accommodate Kāne'ohe-bound traffic with the detour road, assuring two traffic lanes will be available at all times. **See Figure 4, Alternative 6, Phase 1 Site Plan.**

Phase 2

This phase allows for the demolition and reconstruction of the mauka side of the bridge. Work includes:

- Demolish the mauka side of the existing bridge and construct the makai side of the bridge. *Maintain a single lane of traffic for Kahuku-bound traffic on the portion of the new bridge constructed in Phase 1.*
- *Accommodate Kāne'ohe-bound traffic with a detour road, assuring two traffic lanes will be available at all times.* **See Figure 5, Alternative 6, Phase 2 Site Plan.**



Note:
See Table 3 for Sight Distance Concerns

FIGURE 4
ALTERNATIVE 6, PHASE 1 SITE PLAN
Kaipapaʻu Stream Bridge Replacement
Koʻolauloa District, Oʻahu, Hawaiʻi

R. M. TOWILL CORPORATION February 2007

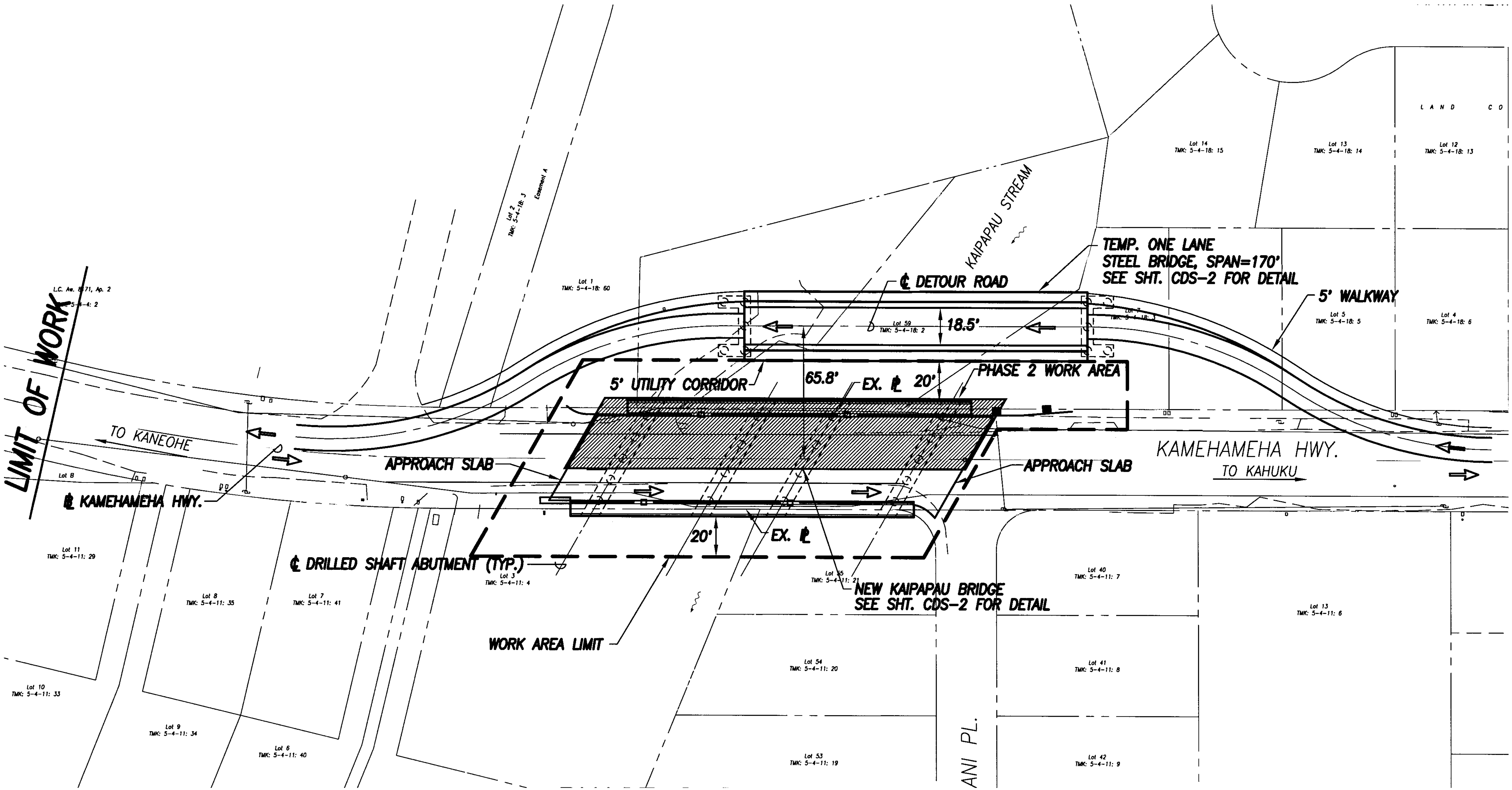


FIGURE 5
ALTERNATIVE 6, PHASE 2 SITE PLAN
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

0 50 Feet 100

R. M. TOWILL CORPORATION February 2007

Note:
See Table 3 for Sight Distance Concerns

Alternative 7: Bridge Replacement - Two-Lane Detour Road (Mauka)

Phase 1

This phase allows for the construction of the two-lane detour road. The two-lane detour road will permit construction to be done in a single phase. Work includes:

- *Prior to demolition of the existing bridge, construct a two-lane detour road on the mauka side of the existing bridge.* Locate the detour road to provide a minimum of 20 feet of horizontal clearance between the detour road and the new bridge.
- *Divert all through-traffic to the detour road to provide two traffic lanes available at all times.* Provide an access lane to the detour road for traffic to and from Pipilani Lane. See Figure 6, Alternative 7, Site Plan.

Alternative 8: Bridge Replacement - Two-Lane Detour Road (Makai)

Phase 1

This phase allows for the construction of the two-lane detour road. The two-lane detour road will permit construction to be done in a single phase. Work includes:

- *Prior to demolition of the existing bridge, construct a two-lane detour road on the makai side of the existing bridge.* Locate the detour road to provide a minimum of 20 feet of horizontal clearance between the detour road and the new bridge.
- *Divert all through-traffic to the detour road to provide two traffic lanes available at all times.* Provide an access lane to the detour road for traffic to and from Pipilani Lane. See Figure 7, Alternative 8, Site Plan.

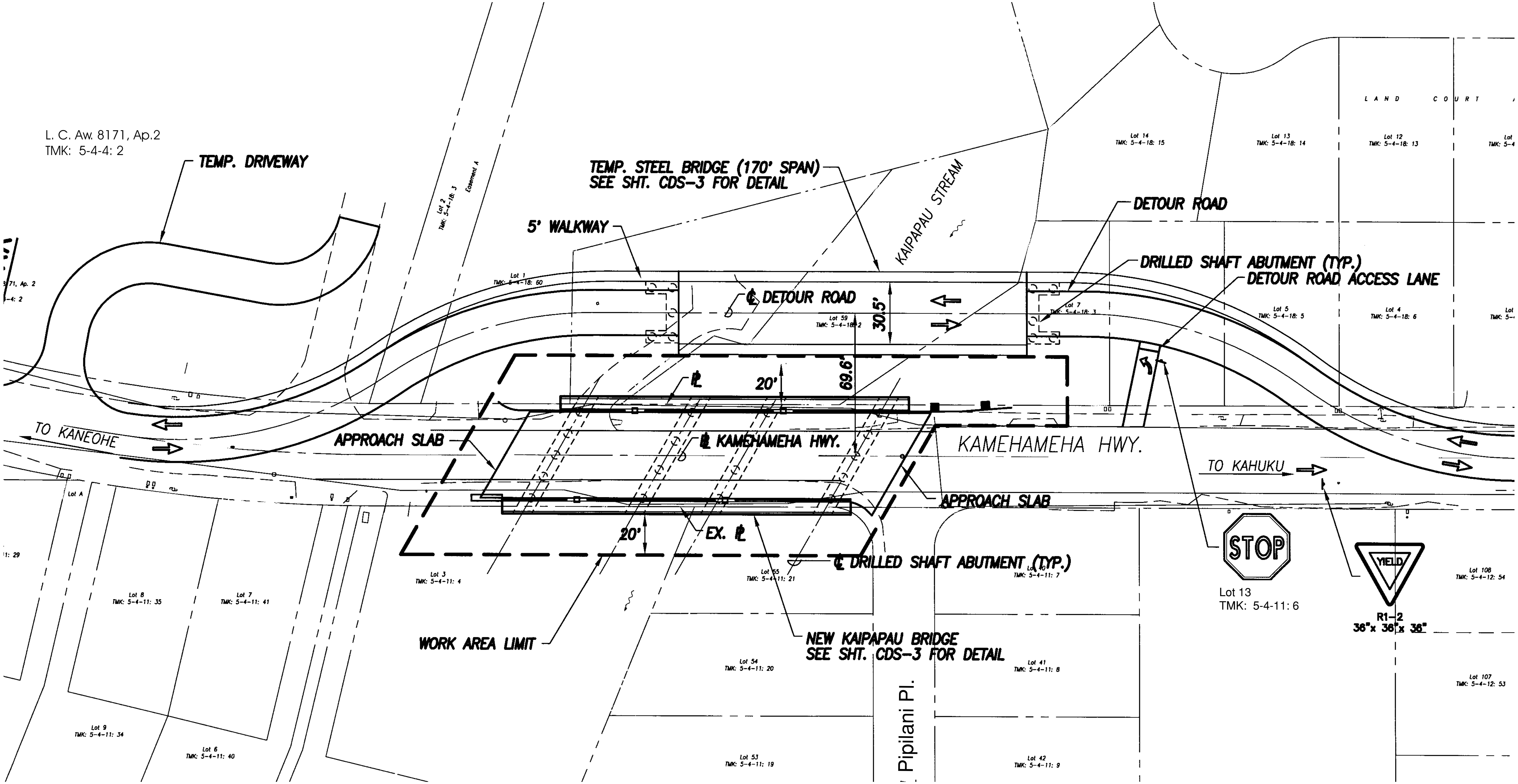


FIGURE 6
ALTERNATIVE 7 SITE PLAN
Kaipapa‘u Stream Bridge Replacement
Ko‘olauloa District, O‘ahu, Hawai‘i

Note:
See Table 3 for Sight Distance Concerns

0 50 Feet 100

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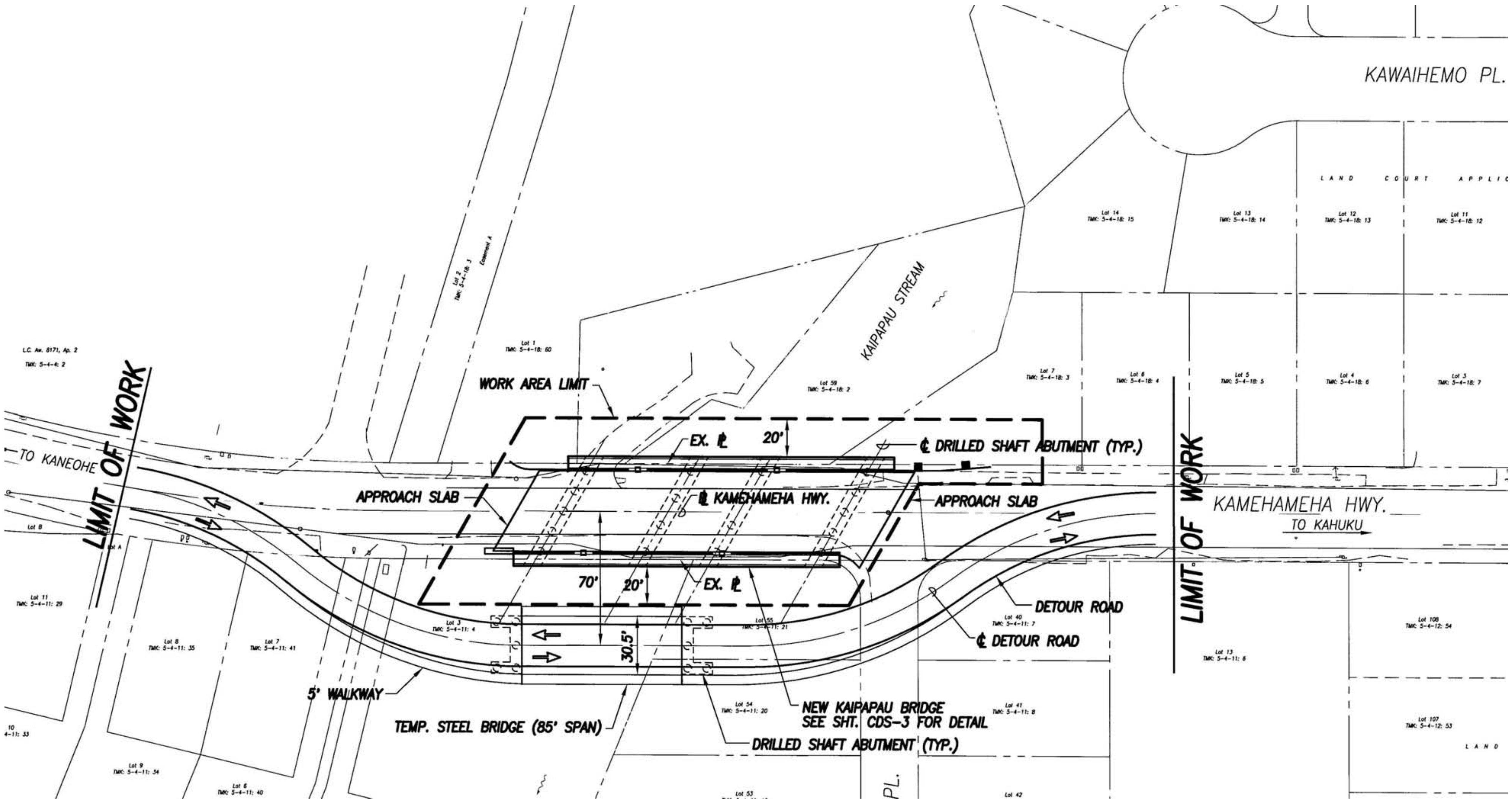

Note:
See Table 3 for Sight Distance Concerns

FIGURE 7
ALTERNATIVE 8 SITE PLAN
Kaipapa‘u Stream Bridge Replacement
Ko‘olauloa District, O‘ahu, Hawai‘i

0 50 Feet 100

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2.7 UTILITY RELOCATION REQUIREMENTS

Each alternative considered the existing overhead electrical utility lines and poles as well as relocation of existing 12-inch and 16-inch water lines. **See Table 2, Relocation of Utilities**, for a summary of utility requirements for each alternative.

Table 2

Relocation of Utilities

Alternative		Phase 1 Utility Relocation Requirements	Phase 2 Utility Relocation Requirements
4	Bridge Replacement and Widening - No Detour Road	Temporarily relocate existing 16" diameter water line (in the streambed, makai of the existing bridge) to the mauka underside of existing bridge. (Phase 1) Temporarily relocate existing 12" diameter waterline (currently in the streambed, mauka of the existing bridge) to the mauka underside of existing bridge. (Phase 2) Temporarily relocate the existing overhead electrical utilities on both mauka and makai sides of the work area.	Relocate 16" diameter waterline from mauka underside of existing bridge to the makai underside of the Phase 1 portion of the bridge. (Phase 2) Relocate existing 12" diameter waterline from the mauka underside of the existing bridge to the mauka side of the Phase 2 portion of the bridge. (Phase 3)
5	Bridge Rehabilitation and Widening - No Detour Road	Relocate existing 16" diameter water line (currently in the streambed, makai of the existing bridge) to the mauka underside of existing bridge. Temporarily relocate the existing overhead electrical utilities on both mauka and makai sides of the work area.	Relocate existing 12" diameter waterline (in the streambed, mauka of the existing bridge) to the makai underside of existing bridge. Relocate 16" diameter waterline from mauka underside of existing bridge to the makai underside of the Phase 1 portion of the bridge widening adjacent to the relocated 12" diameter waterline.

6	Bridge Replacement - One-Lane Detour Road (Mauka)	Temporarily relocate existing 12-inch water line adjacent to the detour road and attach to the detour bridge on the makai side of existing bridge. Temporarily relocate existing overhead electrical utilities to the mauka side away from new construction.	Permanently realign the 12-inch water line on the makai underside of existing bridge. Relocate existing 16" diameter water line (currently in the streambed, makai of the existing bridge) to the makai underside of the Phase 1 portion of the bridge widening adjacent to the relocated 12" diameter waterline.
7	Bridge Replacement - Two-Lane Detour Road (Mauka)	Same as Alternative 6	Same as Alternative 6
8	Bridge Replacement - Two-Lane Detour Road (Makai)	Temporarily relocate existing 16-inch water line adjacent to the detour road and attach to the detour bridge on the mauka side.	Permanently realign the 16-inch water line (in the streambed, makai of the existing bridge) to the makai underside of the Phase 1 portion of the bridge widening adjacent to the relocated 12" diameter waterline.

2.8 SITE DISTANCE DURING CONSTRUCTION

The alternatives which feature either no detour road or one detour road also carry site distance concerns. The alternatives proposing a two-lane detour road will not impact site distance for vehicle travel. **See Table 3, Site Distance During Construction**.

Table 3
Site Distance During Construction

#	Alternative	Sight Distance Issues, If Any
4	Bridge Replacement and Widening - No Detour Road	During construction, there are potential sight distance conflicts through the work area for cars entering the highway from driveways and side streets.
5	Bridge Rehabilitation and Widening - No Detour Road	During construction, there are potential sight distance conflicts through the work area for cars entering the highway from driveways and side streets.
6	Bridge Replacement - One-Lane Detour Road (Mauka)	During construction, there are potential sight distance conflicts through the work area for cars entering the highway from driveways and side streets.

7	Bridge Replacement - Two-Lane Detour Road (Mauka)	During construction, there are no potential sight distance conflicts for cars entering the highway from driveways and side streets. After construction, there is potential sight distance conflict with the new bridge railing from the driveway for the property at TMK: 5-4-18:60, as shown on Figure 5. The design of the new bridge railing will accommodate the line of sight from this existing driveway.
8	Bridge Replacement - Two-Lane Detour Road (Makai)	During construction, there are no potential sight distance conflicts for cars entering the highway from driveways and side streets. After construction, there is potential sight distance conflict with the new bridge railing from the driveway for the property at TMK: 5-4-18:60, as shown on Figure 6. The design of the new bridge railing will accommodate the line of sight from this existing driveway.

2.9 CONSTRUCTION DURATION

Construction will be the longest for Alternative 6, one-lane detour road on the mauka side and shortest for Alternative 4, no detour road.

Table 4

Construction Duration

Alternative		Duration (Estimate)
4	Bridge Replacement and Widening - No Detour Road	16 months
5	Bridge Rehabilitation and Widening - No Detour Road	18 months
6	Bridge Replacement - One-Lane Detour Road (Mauka)	22 months
7	Bridge Replacement - Two-Lane Detour Road (Mauka)	17 months
8	Bridge Replacement - Two-Lane Detour Road (Makai)	17 months

2.10 PEDESTRIAN ACCESS DURING CONSTRUCTION

During Phase 1 of Alternative 4, pedestrians will continue to use the existing wooden bridge. During Phase 2, a 5-foot temporary pedestrian walkway will be provided on the existing bridge. A temporary pedestrian walkway will be built on the mauka side of the bridge during phase 3. The temporary pedestrian walkway will be removed in Phase 4.

During Phase 1 of Alternative 5, pedestrians will continue to use the existing wooden walkway. During Phase 2, a 5-foot temporary pedestrian bridge will be built mauka of the work area. This pedestrian access will be maintained during phase 3 and then shifted to the makai side of the bridge during Phase 4. In Phases 5 & 6, pedestrian access will be shifted temporarily to the mauka side of the bridge. The temporary pedestrian walkway will be removed in Phase 7.

Pedestrian access during construction is the same for Alternatives 6, 7 and 8: a 4-foot wide sidewalk will be provided on the mauka side of the detour road.

2.11 ALTERNATIVE COMPARISON

A summary comparison of the advantages and disadvantages between the alternatives are presented in Table 5. Costs associated with each alternative are also presented.

Table 5
Alternative Comparison

Alt	Advantages	Disadvantages	Est. Cost	ROW Cost	Vehicular User Cost*
4	- Requires the least ROW acquisition - Second lowest construction cost - Shortest construction time - Lowest vehicular user cost		$11.55 mil.	$0.33 mil	$0.59

5	- Less ROW acquisition than Alts. 6, 7 & 8 - Lowest construction cost - Second lowest vehicular user cost	- Longer construction time	$10.9 mil.	$0.73 mil.	$0.66 mil.
6	- Less ROW acquisition than Alt. 8	- Highest Vehicle User Cost - Highest construction cost - Longest construction time	$13.0 mil.	$1.7 mil.	$1.0 mil.
7	- Lower vehicular user cost than for Alt. 6 - Second shortest construction time - Bridge construction less difficult and challenging than Alts. 4, 5 & 6	- Requires the most ROW acquisition - Longer construction time	$12.9 mil.	$2.3 mil.	$0.74 mil.
8	- Third lowest construction cost - Second shortest construction time - Less ROW acquisition required than Alt. 7	- Second highest ROW cost	$12.1 mil.	$1.9 mil.	$0.67 mil.

* Vehicular User Cost was determined by using FHWA's Real Cost Program - a measure of cost to vehicular users based on number of vehicles, speed, average traffic, length of detour and duration.

2.12 PREFERRED ALTERNATIVE

Based on the comparison presented in Table 5 and evaluation of the information presented in Sections 2.7 through 2.11, <u>Alternative 4 is the preferred alternative</u> for the following reasons:

- Lowest vehicle user cost of all the alternatives
- Least ROW acquisition required of all the alternatives
- Least land disturbance

CHAPTER 3

PROJECT DESCRIPTION

3.1 EXISTING CONDITIONS

The Kaipapaʻu Stream Bridge carries inbound and outbound traffic on Kamehameha Highway near milepost 20.99. At the existing bridge, Kamehameha Highway has 12-foot approach lanes with paved shoulders in both directions and a current speed limit of 35 miles per hour.

The existing bridge was constructed in 1932 and is 82 feet long by 28.4 feet wide. The bridge is a historical structure, although it is not listed on the State Draft Historic Bridge Inventory and Evaluation, dated May 1996. The bridge serves northbound traffic (toward Kahuku) and southbound traffic (toward Kāneʻohe) on Kamehameha Highway. The bridge structure has two 40-foot spans and is constructed from reinforced concrete with a wooden pedestrian walkway attached to the mauka (west) side of the bridge.

Lands surrounding the bridge are single family residential and commercial in character and are privately owned. Several blocks to the north of the site is the Hauʻula Shopping Center, a strip mall with retail space and a parking lot. Parcels immediately surrounding Kaipapaʻu Stream Bridge are single family residential.

3.2 TECHNICAL CHARACTERISTICS

The proposed replacement and widened bridge will measure approximately 110 feet long by 57 feet wide that will meet and State and Federal roadway, bridge and seismic standards. The structure will utilize prestressed concrete planks with cast-in-place deck topping with separated bikeway/pedestrian walkways on both sides.

The proposed design includes two 12-foot travel lanes plus two 8.5-foot shoulders, two 5-foot pedestrian walkways/bicycle lanes, reinforced guardrails, and drainage features. The approach and trailing guardrails will comply with the current standards of the State Department of

Transportation, Highways Division, Design Branch. Rip-rap or CRM will be installed on the banks of the stream beneath the bridge abutments to stabilize the embankment. The bridge and approach roads shall conform to AASHTO and SDOT-H design criteria for roadway widths and safety features.

The new ROW will be 63 feet, 4 inches wide. Acquisition of additional property is required to allow for waterlines to be supported on the outside edges of the new bridge. In all, four new drilled shafts will be constructed in the stream channel for the replacement bridge foundation. The existing concrete center wall pier will be removed.

3.3 CONSTRUCTION SEQUENCE

The proposed project will involve the following actions.

- 3.3.1 Mobilization
- 3.3.2 Installation of Discharge Pollution Prevention Measures
- 3.3.3 Temporary Realignment of Approach Roads During Construction
- 3.3.4 Bridge Replacement and Widening (including, construction of makai new bridge section, construction of mauka new bridge section and dismantling and reconstruction of new bridge)
- 3.3.5 Demobilization and Restoration

3.3.1 Mobilization

Mobilization of equipment, materials, and workforce shall occur on an as needed basis, in schedule with the phases of construction. Construction activities will also be conducted from the deck of the existing Kaipapa‘u Stream Bridge and within the gulch at the foot of the bridge pilings.

As this project will require the acquisition and demolition of a property adjacent to the project site, the subject property may also serve as staging and stockpiling areas for construction equipment and material.

Staging and stockpile areas shall be prepared as necessary with appropriate discharge pollution prevention features, refuse containment, parking areas for workers, and clearly marked transit paths for heavy equipment. During mobilization, ground disturbance shall be held to the minimum area necessary to accommodate the heavy equipment and materials required for construction activities.

3.3.2 Installation of Discharge Pollution Prevention Measures

Discharge pollution prevention measures will be installed for each project action as required by the construction activities and project scheduling. Measures to prevent runoff and the release of sediment into Kaipapaʻu Stream during construction will be in place and functional before project activities begin and will be maintained throughout the construction period. Runoff and discharge pollution prevention measures will be incorporated into a site-specific Best Management Practices (BMPs) plan by the project contractor. The contractor shall include, the following control measures in the BMPs:

- A silt screen shall be installed across the stream channel approximately ten feet downstream of the project site. The silt screen shall consist of a filter fabric combined with a layer of polyester netting for support. The screen shall remain in place for the duration of project activities.
- Sediment retention berms lined with silt screen shall be placed along the down-slope edge of active construction areas, and staging and stockpile areas. In particular, sediment retention berms shall be in place during installation of the pier footings and rip-rap or CRM bank stabilization features. These berms shall function to prevent sediment captured in storm runoff from entering Kaipapaʻu Stream. They shall be shaped to retain runoff and trap sediment before it leaves the construction site, and shall be sized to accommodate the volume of runoff generated by a one-inch storm. When construction is complete, the berms and all of their components shall be removed.

- All discharge pollution controls shall be regularly monitored and maintained by the project contractor. In the event of rainfall of 1 inch or greater within a 24 hour period, discharge pollution control measures should be checked within 24 hours of the event. During prolonged rainfall, control measures should be checked daily. If a severe storm event such as a 100-year storm occurs, then construction activities shall stop, equipment and materials will be stored, relocated, or otherwise secured against storm impacts, and any discharge control features installed within the stream channel removed. The contractor shall be responsible for recovering any materials or equipment washed away by stream flow.

3.3.3 Temporary Realignment of Approach Roads During Construction

During replacement of the existing bridge, temporary roadway alignments will be constructed within shoulders of the ROW in both directions of approach to the bridge to accommodate temporary traffic lanes located on the new widened portions of the bridge. The temporary traffic lanes will be designed to have a posted speed limit of 25 miles per hour.

Upon completion of the bridge replacement and widening, approach roads will revert to an alignment similar to existing conditions. The improved shoulders will be maintained to service bicycle and pedestrian traffic on both sides of the bridge. **See Figure 2, Alternative 4, Site Plan.**

3.3.4 Bridge Replacement and Widening

Detailed information of activities during the bridge replacement and widening is specified in Section **2.6.1 Construction Sequence and Traffic Control Requirements** for ***Alternative 4, Bridge Replacement and Widening - No Detour Road.***

3.3.5 Demobilization and Restoration

Upon completion of the proposed improvements, the contractor shall restore the project site as much as possible to pre-project conditions. The following shall be undertaken:

- All construction-related material, including excavated material, fill material, and refuse shall be removed from the project site and disposed of properly by the contractor.
- All construction equipment shall be removed from the project site promptly after construction is complete.
- Any modifications to existing utilities, such as power lines or water sources, shall be repaired to their pre-existing condition.
- Roadways providing access to the site shall be cleared of construction debris and any damage from construction traffic will be repaired. Gates and/or fencing removed to provide access to the site shall be replaced and/or repaired. If necessary, the service road extension shall be realigned around the pier footings.
- All areas damaged by construction staging shall be restored. Impacted pasturage, lawns, driveways or vegetated areas shall be replanted and restored. Exposed ground areas shall be seeded or hydro-mulched as appropriate.

3.4 PUBLIC PARTICIPATION

The SDOT consulted with neighborhood groups, organizations and individuals prior to finalizing plans (see **Chapter 9**). Additionally, SDOT shall make available, during all phases of construction, a public outreach person to provide the general public with information about the project activities and to answer and/or resolve concerns regarding the project construction from the general public. The SDOT shall publicize and maintain a telephone "hotline" to facilitate this process.

3.5 PROJECT SCHEDULE AND COST

The entire project will take approximately seven years, as follows:

Design Phase	2003 - 2007
Advertisement, Bid Opening and Contract Award Phase:	2007
Construction Phase:	2008 - 2009

The preliminary construction cost estimate for this project is $11.55 million. Funding for this project will be provided by the Department of Transportation, State of Hawai‘i, and the Federal Highway Administration. The federal government will contribute approximately 80 percent of the construction cost toward completion of the project. The State of Hawai‘i will provide the remaining 20 percent of funding. ROW acquisition cost is estimated at $330,000.

An alternative design for the proposed stream wall (see **Figure 2, Alternative 4, Site Plan**) is being considered in order to: 1) widen the north opening to the bridge making it less prone to capturing debris; and 2) lessen the skew angle of the wall within the stream to address concerns of residents on the south side of the stream. This stream wall alignment alternative will involve construction of a longer wall structure, removal of the existing north abutment and strengthening of a new north abutment.

This alternative will require acquiring approximately 675 square feet of additional land from Lot 54 (TMK: 1-5-4-011:020). The overall phasing of construction would not change with this revised stream wall location. The hydraulics with the new bridge and the revised stream wall location will not change significantly. Overall, if chosen, this alternative will increase the project cost by approximately $ 1 million (order of magnitude).

CHAPTER 4

ENVIRONMENTAL SETTING, POTENTIAL IMPACTS AND MITIGATION

This chapter assesses the environmental consequences of the proposed action described in Chapter 3. The information serves as a baseline for identifying environmental changes resulting from the project. Potential impacts are described and evaluated, and mitigation measures that would minimize and/or reduce potential adverse impacts are identified.

4.1 TOPOGRAPHY

The topography in the vicinity of the existing bridge is relatively flat. Ground elevations along the deck and rails of the existing bridge and roadway range from approximately 10 to 14 feet mean sea level (msl). The stream bed beneath the bridge ranges in elevation from approximately 0.4 to 4 feet msl. Kaipapa‘u Stream flows perennially into the Pacific Ocean immediately to the east of the project site. The shoreline topography is relatively flat. The most significant topographical feature in the vicinity of the project site is Kaipapa‘u Point, which rises toward the ocean to the northeast of the bridge.

Potential Impacts and Mitigation

The elevation of the top of bridge deck upon completion of the project will be approximately the same as before construction. Erosion effects of storm water will require adherence to BMPs proposed for this project.

4.2 CLIMATE

Hau‘ula is located on the windward coast on the northeastern portion of O‘ahu (**Figure 1, Project Location and Vicinity Map**). The climate of the Hau‘ula area is comfortably uniform. The area is characterized by abundant sunshine, persistent northeast tradewinds, relatively constant temperatures, moderate humidity, and the infrequency of severe storms. Average wind velocity in the area varies from 10 to 15 mph. Monthly temperatures in the project area are within the range of 76 degrees Fahrenheit mean temperature in August and 70 degrees Fahrenheit mean temperature in December. Temperatures of 80 degrees and higher are not uncommon throughout the year.

Average annual rainfall recorded at Hau'ula was 59.2 inches (4.9 inches/month) for the period from 1968 to 1991. The dryer months of June through September average 3-4 inches per month. The wetter months of October through April average 5-6.5 inches per month (World Climate, 2003).

Potential Impacts and Mitigation

The proposed project is not expected to have a significant impact on climatic conditions therefore no mitigative measures are proposed. Potential impacts to air quality are discussed in **Section 4.3** below.

4.3 AIR QUALITY

Presently, air quality in the vicinity of the project is good. The primary sources of air pollution are from auto emissions and agricultural activities. Agricultural sources of air pollution include burning of vegetation, spraying of insecticides and herbicides, and equipment emissions. To a lesser and occasional extent, air quality is impacted by natural pollution sources. Natural sources of air pollution that may affect the air quality of the site include the ocean, plants, wind-blown dust and distant volcanoes.

Potential Impacts and Mitigation

Short-term impacts from fugitive dust will likely occur during the project construction phase. To a lesser extent, exhaust emissions from stationary and mobile construction equipment, and from workers' vehicles may also affect air quality during the period of construction.

Long-term air quality impacts will result from the continued use of the bridge by automobile traffic on the Kamehameha Highway. Air quality impacts from automobiles traversing the proposed improved bridge will not be measurably lesser or greater than those incurred from the continued use of the existing bridge. The new Kaipapaʻu Stream Bridge will not, in and of itself, result in increased long-term air quality impacts.

The present ambient air quality in the project area is considered good due to the prevailing northeasterly tradewinds and the absence of "heavy" industries. The air quality is mostly affected by air pollutants from natural and / or vehicular sources. Natural sources include ocean spray, wind-blown dust, possible distant volcanic emissions from the Island of Hawaiʻi, and vehicular emissions from motorists traveling on Kamehameha Highway and local roads.

The proposed project is not expected to have a significant impact on air quality. Construction activities may result in short-term air quality impacts from fugitive dust and equipment emissions. However, construction related impacts to air quality will be temporary and will cease when construction is completed.

Both federal and state standards have been established to maintain ambient air quality at healthy levels. At present, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone, and lead. In most cases, the State of Hawaiʻi's air quality standards are more stringent than the comparable federal limits.

State air pollution control regulations require that there be no visible fugitive dust emissions at the project boundary. Therefore, an effective dust control plan will be implemented by the project contractor to ensure compliance with state regulations. Fugitive dust emissions can be controlled to a large extent by watering of active work areas, using dust screens, keeping adjacent paved roads clean, and by covering open-bodied trucks. Exhaust emissions will be mitigated by ensuring that project contractors properly maintain their internal combustion engines and comply with DOH Rules Title 11, Chapter 59 and 60, regarding Air Pollution Control.

Due to the predicted minimal impact of the project, it appears that mitigation of any long-term impacts is unwarranted.

4.4 SOILS

The area surrounding Kaipapaʻu Stream as it empties into the Pacific Ocean belongs to four soil series: Jaucas, Kawaihapai, Lolekaa, and Waikane. See **Figure 8, Soils Map**.

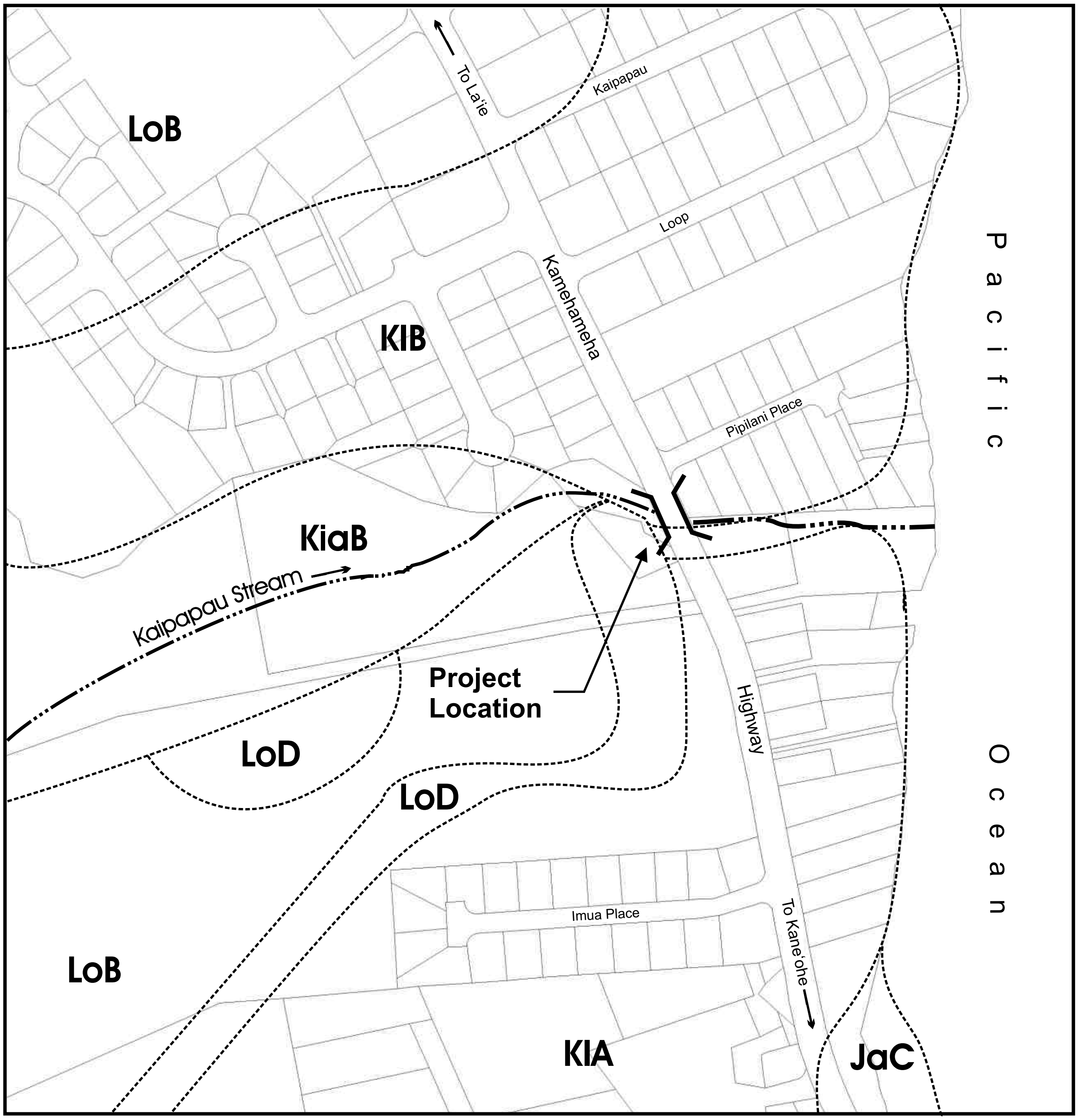
The Jaucas series consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. The area immediately south of Kaipapaʻu Stream Bridge is Jaucas Sand.

JaC Jaucas Sand, 0 to 15 percent slopes - Jaucas sand consists of excessively drained, calcareous soils. In most places the slope does not exceed 7%. Permeability is rapid. Runoff is slow to very slow. The hazard of water erosion is slight, however wind erosion is a severe hazard where vegetation has been removed. Jaucas sand deposits are associated with traditional Hawaiian burial practices and are commonly found to contain archaeological deposits.

The Kawaihapai series consists of well-drained soils in drainageways and on alluvial fans on the coastal plains of Oʻahu. These soils formed the alluvium derived from basic igneous rock in humid uplands.

KlA Kawaihapai clay loam, 0 to 2 percent slopes - Kawaihapai soils consist of well-drained soils in drainageways and on alluvial fans on the coastal plains. Permeability in this soil type is moderate, runoff is slow, and the erosion hazard is no more than slight.

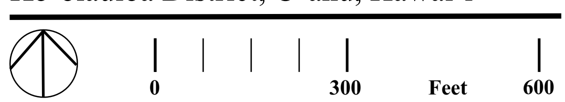
KiaB Kawaihapai stony clay loam, 0 to 2 percent slopes - runoff is slow and erosion hazard is slight. This soil type is prevalent on the banks of the Kaipapaʻu Stream.



LEGEND

JaC – Jaucas Sand, 0-15% slopes.
KIA – Kawaihapai clay loam, 0-2% slopes.
KiaB – Kawaihapai stony clay loam.
KIB – Kawaihapai clay loam, 2-6% slopes.
LoB – Lolekaa silty clay, 3-8% slopes.
LoD – Lolekaa silty clay, 15-25% slopes.

FIGURE 8
SOILS MAP
Kaipapaʻu Stream Bridge Replacement
Koʻolauloa District, Oʻahu, Hawaiʻi



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KIB Kawaihapai clay loam, 2 to 6 percent slopes - Kawaihapai soils consists of soils where runoff is slow and the erosion hazard is slight. This soil type is found to the north of the Kaipapa'u Bridge, between Kamehameha Highway and the Pacific Ocean.

The Lolekaa series consists of well-drained soils on fans and terraces on the windward side of the island of O'ahu. These soils developed in old, gravelly colluvium and alluvium.

LoB Lolekaa silty clay, 3 to 8 percent slopes - This soil is found in terraces and fans. Runoff is slow, and erosion hazard is slight.

LoD Lolekaa silty clay, 15 to 25 percent slopes - This soil is on side slopes of terraces and along drainageways. Runoff is medium, and the erosion hazard is moderate. This soil type is found in one area along the shoulder of Kaipapa'u Stream.

The Waikane series consists of well-drained soils on the island of O'ahu. These soils developed in alluvium and colluvium derived from igneous rock.

WpB Waikane silty clay, 3 to 8 percent slopes - Runoff is slow and erosion hazard is slight.

WpC Waikane silty clay, 8 to 15 percent slopes - On this soil, runoff is slow to medium and the erosion hazard is slight to moderate.

Potential Impacts and Mitigation

No significant impacts to soils are anticipated as a result from this project.

Soil erosion will be minimized through the installation of erosion and sediment control measures in compliance with HAR, Chapter 11-55 and construction BMPs proposed for this project.

4.5 WATER QUALITY

The various gulches in the Hau'ula community collect runoff from urban, agricultural, and vacant natural areas. Runoff constituents are carried downhill, and are discharged into the ocean during peak precipitation periods, thereby periodically degrading ocean water quality. Runoff constituents include silt, organic material, debris, trash, terrigenous bacteria, and dissolved runoff constituents.

Potential impacts to surface water, groundwater, and wetlands are discussed below. Overall mitigation measures to address potential impacts to water quality is discussed in **Section 4.5.4**.

4.5.1 Surface Water

Kaipapa'u Stream is assigned the code number 3-1-10 in the Hawai'i Stream Assessment. It is generally described as a perennial stream. At the project site, Kaipapa'u Stream is characterized as perennial. The amount of water flow depends on seasonal rainfall conditions.

Coastal marine waters, located approximately 300 feet downstream of the project site, are designated as "Class A" by the DOH-Clean Water Branch. Waters designated as "Class A" are to be protected for recreational uses, aesthetic enjoyment, and protection and propagation of marine life.

Potential Impacts

Because the proposed project involves construction activities within the stream channel and extensive work in proximity to the stream, the potential for negative effects to the stream and near-shore environments does exist. Negative effects include pollution discharge into the stream which empties into the ocean nearby. In-stream activity includes installation of temporary sediment retention features, drilled shafts for bridge pilings and staging and maneuvering of heavy equipment. Potential for pollutant discharge into surface waters of Kaipapa'u Stream during construction would primarily result from release of silt and suspended sediments during excavation and grading activities or during extreme storm conditions.

Dewatering activities are anticipated during the installation of the drilled shafts within the stream channel. If the dewatering effluent were discharged into Kaipapa'u Stream, it will pose a potential source of sediment pollution if not filtered first. Additionally, debris dropped during demolition of the existing bridge is a potential source of discharge pollution. Materials to be placed temporarily in State waters include silt fencing with reinforcement netting, water monitoring devices, and heavy equipment used during bridge dismantlement.

4.5.2 Groundwater

The Hau'ula plain is underlain by two aquifers: a shallow "caprock" aquifer and a deeper basalt aquifer. The caprock aquifer is composed of coral, sand, silt, lithified dunes, and clay. Sedimentary materials such as clay strata and limestone within the caprock interferes with the movement of groundwater. Groundwater within the cap rock moves toward the ocean, however, local variations may affect the flow direction. This underlying groundwater is not considered a drinking water source.

The deeper basalt aquifer underlies the cap rock aquifer and extends thousands of feet into the subsurface. The basalt aquifer consists of thin bedded lava flows of very high permeability. The upper portion of the basalt aquifer is comprised of weathered volcanics that normally have a lower permeability than the underlying unweathered basalt. The basalt aquifer, like the cap rock aquifer is also recharged predominantly by rainfall, primarily from the mountains mauka of Hau'ula.

Potential Impacts

The project is not expected to have significant impacts to the underlying groundwater. The project will involve installation of drilled shafts with depths between 30 and 50 feet. However, once construction of the shafts is complete, no further construction involving deep excavations are required.

4.5.3 Wetlands

There are no wetlands in the immediate vicinity of the project area. The closest wetland designated by the U.S. fish and Wildlife Service is approximately 0.25 miles mauka of the project site.

Potential Impacts

The project is not expected to have any significant impacts to wetlands in the area, therefore no mitigation is proposed.

4.5.4 Mitigation Measures

No adverse impacts to water quality are anticipated from construction activities associated with this project. Through the following proposed measures and practices, anticipated impacts should be adequately addressed.

Runoff from construction areas will be regulated under NPDES permit conditions. BMPs will be employed to prevent soil loss and sediment discharges from work sites. Project activities and operation of the system following project completion will comply with DOH regulations as set forth in Hawaiʻi Administrative Rules, Title 11 Chapter 54 - Water Quality Standards, and Chapter 55 - Water Pollution Controls.

Due to the high groundwater level and the close proximity to the ocean and residential dwellings, detailed dewatering and shoring design recommendations will be provided by geotechnical consultants and integrated into the construction plans.

Pursuant to Section 14-12.22 Revised Ordinances of Honolulu 1990, as amended, and Section 401 of the Clean Water Act of 1977, SDOT-H will obtain Water Quality Certification from DOH in conjunction with the Department of the Army Nationwide Permit. During all phases of the project, the stream will be monitored for water quality as outlined in a DOH-approved Water Quality Monitoring Plan.

Discharge pollution prevention measures will be employed in all phases of the project. Control measures will be in place and functional before construction activities begin, and will be maintained throughout the construction period. A site-specific plan to prevent runoff and discharge of other pollutants into State waters, including removal procedures for the construction site BMPs, will be prepared by the project contractor as part of the project construction plan. The construction plan will be submitted to the Director of the DOH-Clean Water Branch for review.

A site-specific BMPs plan will be prepared by the project contractor as part of the project construction plan. The BMPs will include guidelines and mitigation measures to prevent runoff, discharge pollution, and other detrimental impacts related to construction activities. BMPs will be designed and implemented for normal stream flow conditions at the project site and will include contingency plans to respond to heavy rainfall conditions.

Regional and special conditions outlined by the Army Corps of Engineers (ACOE) and DOH per requirements of Section 404 and 401 permits will also be addressed in the site-specific BMPs.

Mitigation measures, in addition to the discharge pollution controls described above, shall include, but not be limited to the following:

- Clearing and excavation shall be held to a minimum necessary to meet project design and construction plan requirements.
- Construction shall be phased to minimize the exposure time of cleared or excavated areas. Existing ground cover shall not be destroyed, removed or disturbed more than 20 calendar days prior to the start of construction.
- Stabilization shall be accomplished by temporarily or permanently protecting the disturbed surface from rainfall impacts and runoff.
- Storm water flowing toward active project areas shall be diverted as much as practicable using the appropriate controls, including berms and silt fences, as determined by the contractor according to site conditions.
- Areas that remain unfinished for more than 30 calendar days shall be hydro-mulched or seeded to provide temporary soil stabilization.

- The project contractor will select locations for stockpiling construction material. Stockpile sites will be identified in the site-specific BMPs and construction plans. A sediment retention berm or silt fence will be installed around the down-slope side of stockpile sites to retain sediment discharge during heavy rainfall.
- No fuel will be stored on the project site. Fueling of construction equipment will only be performed off-site or within an area designated by the contractor. Any site designated for refueling shall be located away from the stream, enclosed by a containment berm and constructed to contain spills and seepage and prevent storm water runoff from carrying pollutants into state coastal waters.
- Dewatering effluent water will be filtered before being discharged into Kaipapa‘u Stream. The filtration system will consist of an enclosed box containing at least two filter screens comprised of a geotextile filter fabric that allows water to flow through while capturing soil particles. The project contractor will monitor the filtration system for clogging or failure and immediately repair or replace any damaged or ineffective components.
- In the event of a severe storm event that may result in flooding of the work site within the stream bed, all construction equipment and materials, including discharge pollution prevention and dewatering measures, will be removed from the project site to a secure staging area above the potential flood level.
- During demolition of the old bridge, care will be taken to prevent bridge debris from falling into Kaipapa‘u Stream. Measures may include safety nets and screens installed under areas of active demolition to capture falling materials.

The contractor, based on professional experience and expertise, may modify the proposed BMP mitigation measures as necessary to account for unanticipated or changed site conditions.

4.6 NATURAL HAZARDS

4.6.1 Earthquakes

The Uniform Building Code (UBC) provides minimum design criteria to address potential for damage due to seismic disturbances. Range of seismic risk varies from Zone 0, indicating no damage, to Zone 4, indicating major damage. The island of O'ahu is in Seismic Zone 2, as established by the UBC, indicating a moderate risk of damage from earthquake.

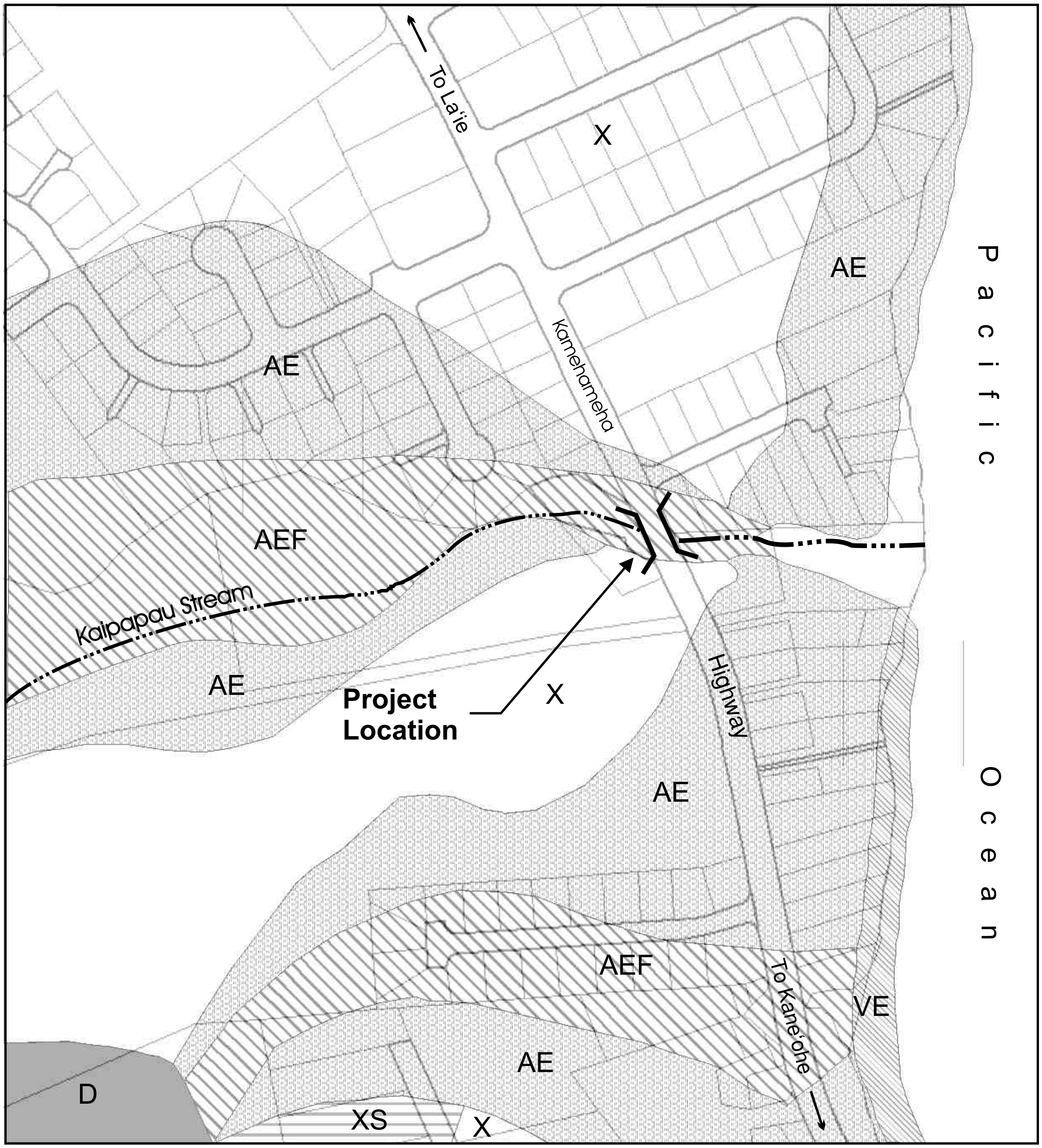
Potential Impacts and Mitigation

A seismic event could affect bridge integrity. SDOT-H will ensure that bridge design is compliant with current seismic parameters for bridge design. All structures proposed for this project will be built, at a minimum, according to standards for UBC Seismic Zone 2.

4.6.2 Flood Zones

The majority of the Kaipapa'u Stream Bridge area is subject to flooding. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) of November 20, 2000 identifies the Kaipapa'u Stream Bridge project site as lying within Zone AE – areas within the 100-year flood inundation zone in which base flood elevations are between 10 and 14 feet. **See Figure 9, Flood Zone Map**.

The FEMA flood profile for the existing stream conditions show that during the 100-year storm, the existing bridge is overtopped by about 3 feet. A conceptual hydrology and hydraulics study was prepared for the proposed project. A comparison of the flow profiles for the existing and proposed condition shows that the water surface elevation over the proposed bridge is higher than the existing condition by 0.8 to 1.0 feet. The proposed bridge would increase the base flood elevation in the bridge area by no more than 1.0 feet. During a 100-year storm event, the flow profile for the proposed bridge shows that the stream would overtop the new bridge by between 2.3 to 3.2 feet.



LEGEND

X	Areas outside the 1% annual chance flood plain.
XS	Areas with 1% annual chance of flooding with average depths of less than 1 foot with drainage areas of less than 1 square mile.
D	Areas in which flood hazards are undetermined.
VE	1% annual chance of flooding that also have storm wave hazards.
AE	Areas with 1% annual chance of flooding.
AEF	The watercourse or portion of the flood plain which must be reserved in order to carry or discharge the regulatory flood without cumulatively increasing the flood elevation of the flood plain more than a foot at any given point.

FIGURE 9
FLOOD ZONE MAP
Kaipapa‘u Stream Bridge Replacement
Ko‘olauloa District, O‘ahu, Hawai‘i

0 300 Feet 600

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Potential Impacts and Mitigation

Designing the proposed bridge to avoid overtopping would require raising of the bridge by more than 5 feet, which would be unacceptable as it would cut off access from adjacent properties and nearby roadways onto the Kamehameha Highway.

Potential impacts will be mitigated by the design of the new bridge that will withstand the effects of overtopping of the bridge from 100-year flooding events. The center pier and abutments will be designed to withstand the effects of scour. The design and construction of the replacement bridge shall comply with all applicable FEMA requirements, including filing of a Conditional Letter of Map Revision (CLOMR) if required.

4.6.3 Hurricanes

In Hawai'i, northeast trade winds predominate throughout most of the year and generally range in velocity between 10 and 20 mph. Trade winds of 40-60 mph periodically occur. Damaging winds, in addition to severe flooding events on Oahu are most commonly associated with passing tropical storms or hurricanes.

Potential Impacts and Mitigation

To mitigate for the potential effects of hurricanes, the replaced and widened bridge will be designed in accordance with the latest AASHTO Load and Resistance Factor Design (LRFD) specifications.

4.6.4 Tsunami

The project involves the replacement and widening of an existing bridge along Kamehameha Highway. Kamehameha Highway at the Kaipapa'u Stream Bridge is within the tsunami evacuation area based on information provided by the Civil Defense. The bridge is also within an area affected by coastal flooding.

Potential Impacts and Mitigation

To mitigate for the potential effects of tsunami and coastal flooding events, the improved bridge will be designed in accordance with the latest Federal and State bridge and roadway standards.

4.7 NOISE

Ambient noise levels in the area are currently dominated by traffic on the Kamehameha Highway, with an occasional overflight by aircraft. Additional noise sources result from the use of agricultural equipment in the area, including tractors, compressors, and hand-held gas-powered tools. A study to assess noise impacts was conducted by D.L. Adams and Associates. Their findings are summarized below and re-printed in the Appendix.

Potential Impacts and Mitigation

Construction of the proposed bridge will involve excavating, grading, concrete casting, the placement of pre-cast structural components, and paving. The various construction phases will likely generate noise which could impact nearby areas. The actual noise levels produced are dependent on the construction methods employed during each phase of the construction process. Earth moving equipment, such as diesel engine powered bulldozers, trucks, backhoes, front-end loaders, graders, etc., will probably be the noisiest equipment used during construction. However, as the noise will be temporary, no lasting impact from the proposed project is expected.

Long-term noise impacts from automobiles traversing the proposed replacement bridge will not be measurably lesser or greater than those generated from the continued use of the existing bridge. The replaced Kaipapaʻu Stream Bridge will not, in and of itself, result in increased long-term noise impacts.

Ambient noise conditions in the proposed project area are generally low due to the rural location. The dominant noise is from vehicular traffic along Kamehameha Highway and the local roadways, and from wind. Local residences are generally exposed to sound levels ranging from 70 dB to 60 dB or lower (Day-Night average sound levels). Other normal daytime sources of noise include lawn mowers, barking dogs, and power tools.

Short-term noise impacts are related primarily to construction activities. A majority of the noise will be generated during mobilization and operation of heavy construction equipment. Construction equipment noise is expected to be in the range of 55 and 90 dBA in close proximity to the site. To mitigate short-term construction related impacts, the contractor will ensure that project activities are in compliance with the provisions of HAR, Chapter 11-46, "Community Noise Control".

No long-term noise impacts are expected to result from the replacement and widening of the Kaipapa'u Stream Bridge . Use of the completed bridge will result in vehicular noise comparable to the traffic level at the present time, as the bridge will remain a two-lane facility.

In order to mitigate noise impacts, contractors will muffle all construction vehicles and machinery and maintain all noise attenuation equipment in good operating condition. Faulty equipment will be repaired or replaced. Additionally, construction activities and use of heavy equipment will be scheduled as much as possible during daylight hours to avoid disturbing area residents during the evening.

Residents of three (3) adjacent properties will be temporarily relocated due to noise impacts and safety concerns during construction. See **Section 5.2** for the specific properties. The residents will be allowed to move back into their houses after the construction is complete.

4.8 BIOLOGICAL RESOURCES

4.8.1 Flora

A botanical survey of the area proposed for the new bridge structure, the realigned approach roadways, and the area adjacent to and underneath the existing bridge was conducted by Winona Char, in April 2004. The vegetation at the proposed project site is dominated by introduced species such as Elephant Grass and Guinea grass (See **Appendix B, Botanical Resources Study, Kaipapa'u Stream Bridge Replacement Project, Ko'olauloa District, O'ahu**).

Potential Impacts and Mitigation

The proposed project is not expected to have any impact to vegetation within or adjacent to the project. Project activities which include clearing vegetation from construction and staging areas will not impact any rare, threatened or endangered plant species.

After construction completion, all disturbed soils within the project area will be stabilized with ground vegetation or landscaping. As much as possible, disturbed soils will be replanted with native plants.

4.8.2 Fauna

Terrestrial fauna resources were assessed during a site visit. During the visit, no terrestrial animals were observed. Sounds of birds were heard in the distance. Aquatic biota in and around the project site is abundant due to good water quality in Kaipapa'u Stream. Several endemic, indigenous and naturalized aquatic species were observed. A possible sighting of the relatively rare (on O'ahu) O'opu nopili (*Sicypoterus stimpsoni*) was made near the project site. See **Appendix D, Water Quality and Biological Reconnaissance Surveys of Lower Kaipapa'u Stream Near Hau'ula, O'ahu**. The O'opu nopili is considered lower risk/near threatened by the World Conservation Union. The categories that the O'opu nopili is listed in is defined below:

> LOWER RISK (LR) - A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:
>
> > Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.

Near Threatened (nt). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.

Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened.

(Source: http://www.iucnredlist.org/info/categories_criteria1994.html)

Potential Impacts and Mitigation

Noise from heavy equipment and other construction activities might disturb domestic animals and livestock grazing in nearby pastures. Project activities also might alter the local distribution of birds presently visiting the site, but will not impact the overall abundance of these species on O‘ahu.

To minimize the possibility that seabirds may become disoriented and harmed by the lighting, the proposed project will incorporate shielded lighting. This lighting shall be specified on the building permit plans.

Aquatic biota is vulnerable to discharge pollution resulting from construction activities, however water quality monitoring and best management practices will be incorporated into the construction plans to minimize discharge sources. Additionally, no construction activities requiring significant disturbance to the stream bed or stream flow will be conducted during the spawning season (i.e., August through October) of native fishes inhabiting the Kaipapa‘u Stream. During in-stream construction periods, stream flow will be routed around the work area. Stream flow will remain uninterrupted during the entire construction period.

Given the above findings, the proposed project is not anticipated to have a significant negative impact on faunal resources.

4.9 SCENIC RESOURCES

The State and City and County of Honolulu have identified no view planes or scenic vistas in the project vicinity. The bridge is located in a rural gulch setting that offers limited views of the surrounding countryside. The view towards the ocean consists primarily of nearby residences and vegetated slopes rising out of the gulch. Towards the mountains, sight distance is limited by thick vegetation and the rise of gulch topography.

Potential Impacts and Mitigation

Scenic impacts associated with the construction and use of the proposed bridge replacement and widening are discussed in terms of short-term and long-term effects.

Short-term visual impacts associated with the project primarily relate to construction activities. Temporary signage, nighttime lighting, the presence of heavy construction equipment and ongoing modifications to the existing landscape will all create short-term impacts on the visual setting surrounding the project site. Construction activities will be apparent from the Kamehameha Highway corridor and from several homes in the vicinity. Visual impacts related to construction activities are temporary in nature, however, and not considered significant.

The proposed project will result in long-term visual impacts in the form of a new bridge structure that is larger in scale and more modern in appearance than the existing bridge. On close inspection, the existing timber bridge retains a rustic appearance, with weathered beams, rusting girders, and trestle superstructure adorned with accumulated plant growth that blends into the surrounding vegetation. By contrast, the new bridge will be constructed with prestressed planks, cast-in-place deck topping and approach slabs and drilled shaft supported abutments, supported by four five-foot diameter drilled shaft piers anchored in the streambed. The new bridge will be most noticeable from a few surrounding residences, but will not intrude on any existing view planes.

To minimize the visual impact of construction activities, the project contractor will ensure that work crews, heavy equipment, signage and lighting will be utilized only to the extent required for project operations. Additionally, nighttime lighting shall be focused on work areas and shielded from adjacent areas as much as possible.

4.10 AGRICULTURAL ACTIVITY

No farmlands exist within the project area. Therefore, there are no anticipated impacts to, or mitigation measures proposed for farmlands.

CHAPTER 5

THE SOCIAL ENVIRONMENT:

EXISTING CONDITIONS, IMPACTS AND MITIGATION MEASURES

5.1 RESIDENT POPULATION

Hau‘ula is a small settlement within the Ko‘olauloa Census Division, which comprises an area stretching from Ka‘a‘awa to Waimea Bay. Hau‘ula is a Census Designated Place. Between 1990 and 2000, Hau‘ula’s resident population increased from 3,381 to 3,651, or 7.4 percent or less than one percent per year. This represents a stable population base.

Kaipapa‘u Stream Bridge is located in the Hau‘ula-Ka‘a‘awa Census Tract 102.01, in Ko‘olauloa District, O‘ahu. According to the U.S. Census (DBEDT 2000), the residential population of the island of O‘ahu increased by 4.8% between 1990 and 2000, from 836,231 to 876,156 residents. Over the same period, the Ko‘olauloa District population increased by 2.5%, from 18,443 to 18,899 residents. In 1990, Hau‘ula contained 3,479 people as compared to 3,651 people in 2000; an increase of 4.9 %.

Housing in the vicinity of the bridge is rural in character. Area residences are primarily associated with agricultural activities. Over the past ten years, most of the residential growth in the area is a result of new subdivisions developed on agricultural lands.

Potential Impacts and Mitigation

The proposed project is not anticipated to impact the population or housing conditions within the Hau‘ula area. The proposed bridge is designed to maintain the same level of service as the existing bridge with the added benefit of improved safety features. The new bridge will not, in itself, be an impetus to increased development or population growth. No mitigation measures are proposed.

5.2 DEMOLITION OF RESIDENCES AND RELOCATION REQUIREMENTS

In order to accommodate the bridge replacement and widening, the proposed project will require both temporary and permanent relocation of property owners.

Acquisition of residential properties will require the relocation of impacted families. Where the new construction will result in demolition of dwelling structures or substandard lot sizes, or will otherwise negatively impact the function or safety of the property for residential use, permanent relocation of the household will be necessary. For reasons of safety, all of the impacted households will be relocated prior to the period of construction. The State will obtain title to the land required by the widened ROW.

Property owners whose real property is to be acquired, and residents who will be displaced by the proposed project will be eligible for compensation and relocation assistance under the terms and rules of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (The Uniform Act), and the Uniform Relocation Act Amendments of 1987. These acts provide for the fair and equitable treatment of persons whose property will be acquired or who will be displaced because of programs or projects financed with federal funds.

Policies and provisions regarding the acquisition of real property, relocation assistance advisory services, and relocation payments are published in the Federal Register of March 2, 1989, and reprinted each year in the Code of Federal Regulations, Title 49, Part 24. Hawaiʻi Revised Statutes, Title 15, Chapter 264, Part 2, Federal Aid Highways, defers to federal rules and regulations regarding compensation and assistance for displaced families.

Relocation advisory services and payments will be administered by the State Department of Transportation. These services will assist displaced residents in relocating to comparable replacement housing that meets the criteria of "decent, safe, and sanitary," conforming to applicable housing and occupancy codes as established by federal regulations.

Any aggrieved person may file a written appeal with SDOT-H if the person believes SDOT-H has failed to properly determine his or her eligibility for relocation assistance advisory services, or the amount of the relocation payment. The person making the appeal has the right to be represented by legal counsel or other representative, but solely at their own expense. SDOT-H will reply with a written determination and explanation of the decision. If SDOT-H's position is still considered to be unsatisfactory, the aggrieved person may seek a judicial review.

Potential Impacts and Mitigation

The proposed project will result in the temporary relocation of residents on three (3) properties adjacent to the project site. The residents will be allowed to move back into their houses after the construction is complete. The project will also necessitate the demolition of one (1) dwelling due to its close proximity to the project site.

Resident Relocation

TMK: 5-4-11:04 (makai-Kāneʻohe side of bridge, mauka dwelling only)

TMK 5–4-18:01 (mauka-Kāneʻohe side of bridge)

TMK: 5-4-18:03 (mauka-Kahuku side of bridge)

Dwelling Demolition

TMK: 5-4-11: 21 (makai-Kahuku side of bridge)

Prior to construction, the SDOT-H will meet and communicate with affected property owners to reach agreements on the acquisition of lands required for the bridge replacement and widening. Property will not be acquired without just compensation that is fair and equitable to both the property owner and to the public. Just compensation will be determined through a property appraisal conducted by an independent, certified appraiser with the participation of the property owner.

Temporary relocation arrangements will be negotiated with affected property owners and costs borne by SDOT.

5.3 EMPLOYMENT

Employment opportunities within the Hau'ula community are limited. However, the neighborhood is close to Brigham Young University-Hawai'i, Polynesian Cultural Center (PCC), and other commercial and retail establishments. PCC, a tourist attraction, employs a majority of the area residents while BYU-H also employs a considerable number of Hau'ula residents. Additional employment is provided by a shopping center, grocery stores, restaurants, and other retail-sales stores. Due to projected population growth increases as anticipated by the City and County's resident and visitor population, the Hau'ula area will continue to experience an economic surge. Along with new economic opportunities, both resident population and visitor population will continue to grow.

The primary economic activity in the Hau'ula area is agriculture. Taro, banana and other diversified crops and nursery operations are the predominant activities. Cattle ranching, other livestock including chickens and swine, are typically raised on a much smaller scale. (City and County of Honolulu, 1995).

Service and retail activities along the Kamehameha Highway and in the commercial nodes comprise the next most significant source of employment. These enterprises primarily service residents and visitors that travel on Kamehameha Highway.

Potential Impacts and Mitigation

The proposed project is not expected to have significant adverse economic impacts. The proposed infrastructure improvements provide one of the basic services needed to support projected development in the area. Economic impacts from the proposed project will result from construction jobs, services, and procurement in the form of construction supplies and equipment. These benefits will be temporary however, and will cease when the project is complete.

The proposed Kaipapa'u Stream Bridge replacement and widening project is an integral component of SDOT's ongoing program to modify or replace functionally and structurally deficient bridges. The purpose and primary impact of the bridge replacement and widening will be to improve traffic safety conditions for vehicles and pedestrians crossing Kaipapa‘u Stream on the Kamehameha Highway. Additionally, federal funding available for the project will save the State the increasing costs of maintenance to prolong the bridge's useful life and the eventual cost of bridge replacement.

The proposed bridge replacement and widening will help maintain a level of service that supports social and economic activities in the area. Short-term economic impacts from the proposed project will result from construction jobs, services, and procurement in the form of construction supplies and equipment, however these benefits will be primarily realized outside of the local community.

No mitigation measures are required or recommended.

5.4 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

5.4.1 Historic Resources

The existing bridge is a timber structure built in 1932. It is not rated as a historic bridge in the 1996 *State of Hawai'i, Historic Bridge Inventory and Evaluation* (Spencer Mason Architects), because of its lack of unique architectural properties and the absence of significant historical events associated with the bridge. A traditional cultural practices assessment was conducted by Cultural Surveys Hawai‘i in March 2003 and includes an assessment of the bridge. Their findings have been re-printed in **Appendix A** and are summarized below.

Built in 1932, the bridge is technically a historic structure although it is not listed in the State of Hawai‘i "Draft Bridge Inventory and Evaluation" dated May 1996. The Kaipapa‘u Stream Bridge is listed in the National Bridge Inventory (#0033000830302099).

5.4.2 Archaeological Resources

There are no known archaeological sites within the proposed bridge replacement and widening project site. An investigation of the project area included a historic background research on historic properties in the area.

Background data indicates that six kuleana parcels were awarded in Kaipapaʻu in the mid-1800s, two of which formerly existed in the project area at the bridge location. Additionally, two historic sites exist close to the bridge, State Site # 50-80-06-4795 (approximately 350 ft. south) and State Site # 50-80-06-4796 (approximately 120 ft. north).

Burial Sites

Coastal Hauʻula is well known for having been the site of many traditional and early historic Hawaiian burials. The vast majority of these burials have been within or seaward of Kamehameha Highway. Jaucas sand deposits likely to contain burials are likely to exist within or near the present project area. Burials have been encountered immediately to the north and south of the bridge (i.e. Sites - 4795 & 4796).

5.4.3 Cultural Impacts and Traditional Cultural Practices

Since the bridge exists in an urbanized zone of Hauʻula/Kaipapaʻu, ongoing cultural practices were not expected to be prominent. Although the urban nature of the project argues against ongoing cultural practices, it still seems appropriate to briefly summarize potential cultural impacts, as they may be discerned from the historic records and the previous research in the vicinity.

Fishing

Fishing for freshwater resources (e.g. ʻopae, oʻopu) occurred in the stream previous to its urbanization, based on informant information. Undoubtedly, fishing still occurs for similar species though on a much reduced basis. Fishing will not be stopped due to any proposed bridge improvements.

Gathering

The project area has been heavily modified and the only plants present are several palm trees, landscaping foliage near houses, and tall grasses within the stream. At the point of urbanization that the bridge and its surrounding land is at now, no gathering practices are apparent within the project area.

Hunting

Hunting, specifically pig hunting, does not take place within the project area, although hunting does occur further up many of the surrounding valleys.

Sacred Sites

The Hau'ula area was well-known for its many important heiau (including Kaunihokahi, Kaipapa'u, and Lau'ali'i). None of these is understood as having been in or near the present project area.

Trails and Access

No trails or accessways would be inhibited in any way by the replacement of the Kaipapa'u Stream Bridge. The 'modern trail' (Kamehameha Highway) will continue to provide access for pedestrians and two travel lanes for vehicles.

Wahi Pana (Storied Places)

No storied places (wahi pana) are known within the present project area other than the qualities adhering to Kaipapa'u in general.

Conclusions

This effort to evaluate the potential cultural impacts of the proposed project area on the basis of historical data, archaeological data, and informant information, concludes that there may be a possibility of encountering cultural layers and/or human burials during excavation associated with the replacement of the Kaipapa'u Stream Bridge. The entire project area was extensively modified in the past during construction of the former railroad bridge, the Kaipapa'u Stream Bridge, and Kamehameha Highway, and the urbanization of the surrounding land. No traditional cultural practices have been identified within the project area that would be stopped by proposed bridge improvements. See **Appendix A, Traditional Cultural Practices Assessment**.

Potential Impacts and Mitigation

The State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources (DLNR), State of Hawai'i, was contacted for information regarding any significant historic or archaeological features within the project area. DLNR specialists in architecture and archaeology reviewed project plans and a map of the project site to assess the potential for project-related impacts to any cultural resources at or near the site.

Under consultation with SHPD, it has been determined that the proposed project design will have "no adverse effect" on any historic or cultural resources. SHPD concluded that the proposed project will have no adverse effect with the condition that the existing bridge be photographed before demolition. See **Appendix E, SHPD Correspondence**.

In regards to archaeological resources, there is always the possibility that previously unknown or unexpected subsurface cultural features, deposits, or burials may be encountered. To ensure that no subsurface cultural features will be destroyed during project construction, work within the project area will be monitored by the project contractor. In the unlikely event that archaeologically significant remains are encountered, work will cease in the immediate area and the DLNR, State Historic Preservation Division would be notified at (808) 692-8015 to determine significance and treatment of any findings.

CHAPTER 6

PUBLIC UTILITIES AND SERVICES:

EXISTING CONDITIONS, IMPACTS AND MITIGATION MEASURES

6.1 FIRE, POLICE AND MEDICAL SERVICES

Fire protection service is provided through the Honolulu Fire Department's (HFD) Kahuku and Hauʻula Fire Stations. Each fire station has one fire truck and is able to provide engine and medical services. Police protection services are provided by the Honolulu Police Department's (HPD) Kahuku Substation. The Kahuku Hospital is located approximately five to ten minutes drive by car from Laʻie and provides health care services.

Potential Impacts and Mitigation

The proposed project is not expected to have an adverse impact on fire, police and medical services (See correspondence with HFD and HPD in **Appendix F, Public Consultation**). Fire apparatus access will be maintained throughout the construction site for the duration of the project. The Fire Communication Center will be notified of any interruption in the existing fire hydrant system during the project.

6.2 POTABLE WATER

The Honolulu Board of Water Supply (BWS) has two waterlines crossing Kaipapaʻu Stream: a 12-inch waterline located mauka (west) of the bridge and a 16-inch waterline located makai (east) of the bridge. Both waterlines cross beneath Kaipapaʻu Stream and are off-set from the bridge but, based on BWS as-builts, appear to be within the 50-foot road ROW. The 12-inch waterline was constructed in 1969 and the 16-inch waterline was constructed in 1995. A 6-inch waterline which had been attached to the makai side of the bridge structure was removed in 1999. Both lines will be replaced during replacement of the bridge.

Potential Impacts and Mitigation

The proposed bridge work will be coordinated with BWS to minimize service disruptions. Construction plans will be submitted to BWS for approval prior to initiation of project activities.

6.3 ELECTRICITY, CABLE AND TELEPHONE UTILITIES

A preliminary inventory of the overhead electrical utilities at the project site is as follows:

The joint use pole lines on the makai side of Kamehameha Highway appear to consist of 46 kV, 12kV, secondary (120/240 volt), telephone and cable television (CATV) lines. Transformers and highway lights are also mounted on these poles.

The telephone pole lines on the mauka side of Kamehameha Highway appear to consist of approximately 10 major telephone trunk cables, fiber optic cables, and miscellaneous smaller cables. Secondary power lines are located on a few of these poles where required for service drops to residences on the mauka side of Kamehameha Highway.

A joint use pole line extends to each secondary road (Ikea Loop, Kaipapa‘u Stream Loop, Kawaipuna Street, etc.) off Kamehameha Highway. These laterals generally consist of 12 kV, secondary (120/240 volt), telephone, and CATV lines. Transformers and street lights are mounted on some of these poles.

The preliminary inventory of the electrical overhead utilities will be confirmed with the appropriate utility companies: power (HECO), telephone (Hawaiian Telecommunications, Inc., formerly Verizon Hawai‘i), and CATV (Oceanic Cablevision).

Potential Impacts and Mitigation

The proposed bridge work will be coordinated with HECO to minimize service disruptions. As required, other utility service providers will be contacted and arrangements made for review and approval of work that may require relocation of facilities.

6.4 TRAFFIC AND ROADWAYS

6.4.1 Site Access

The Kamehameha Highway is the only major arterial road crossing Kaipapaʻu Stream. Residential roads immediately adjacent to the project site are Pipilani Place, Kaipapaʻu Loop, and Ikea Loop. Access to the project site and staging areas will be primarily via the Kamehameha Highway, but may require a right of entry permit from certain residences. See **Figure 9, Roadway and Community Map**.

The main transportation corridor through Hau'ula is Kamehameha Highway, State Road 83, which is classified as a major arterial. This roadway provides one lane in each direction and is the only access to the Windward coastline of O'ahu from Kāne'ohe to Haleiwa. Average daily traffic along Kamehameha Highway within the project limits was as follows between 1994 and 1998. See **Table 6, Average Daily Traffic**.

Table 6
Average Daily Traffic, Kamehameha Highway, Route 83

AVERAGE DAILY TRAFFIC (Vehicles per Day)	
Year	Total (vpd)
1994	10,756
1995	11,323
1996	11,588
1997	10,971
1998	11,909
2003	13,500
2026	15,700 (proj.)

Throughout the project area, residential driveways, cul-de-sacs, and collector streets access directly onto Kamehameha Highway. Major residential collector roads that intersect Kamehameha Highway in the vicinity include Imua Place, Pipilani Place, Kawaipuna Street, and Kaipapa‘u Loop. See **Figure 10, Roadway and Community Map**.

Access to the project site and staging areas will be primarily via Kamehameha Highway.

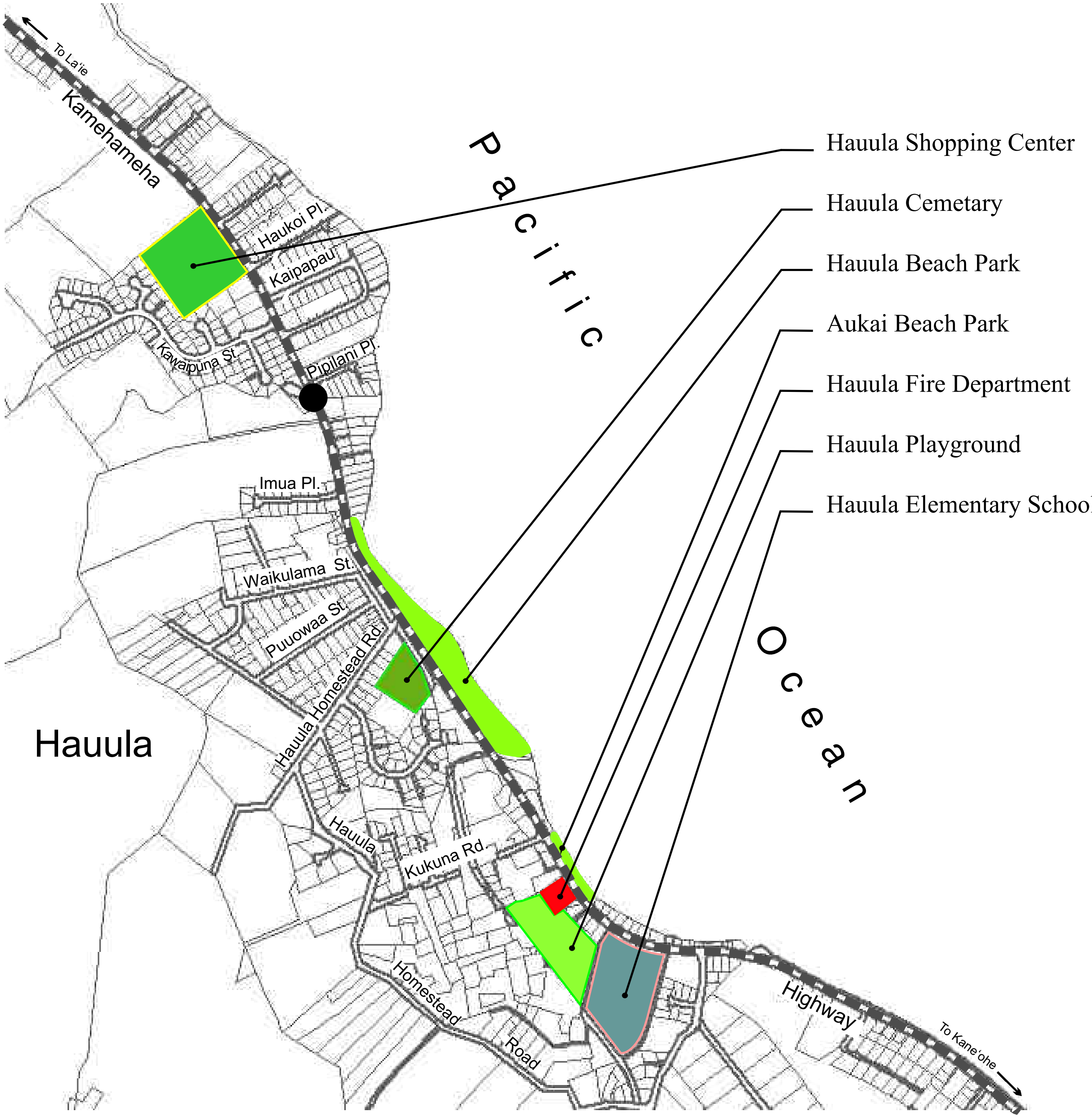
Potential Impacts and Mitigation

Work on Kaipapa‘u Stream will result in a temporary rise in heavy traffic, particularly during mobilization and demobilization of the construction area. Heavy equipment operations during grading and bridge replacement will result in additional temporary impacts to traffic on Kamehameha Highway. Construction traffic on Kamehameha Highway will include movement of heavy equipment between staging areas and the active construction site, transportation of work crews, and truck traffic during removal of excavation spoils and replacement of the existing bridge. These activities are expected to impact regular traffic on the Kamehameha Highway with temporary delays and the presence of large, slow-moving vehicles on the main roadway.

No significant or long-term impacts to Pipilani Place, Imua Road, Kaipapa‘u Loop or Kawaipuna Street are expected from this project. Mitigation measures will be required to maintain access for area residents during construction.

Construction staging and work activities will take place immediately adjacent to Kamehameha Highway and other roadways, and may result in traffic slow downs from temporary detours and the presence of large slow-moving vehicles and heavy equipment. On affected residential streets, excavation may occur within the travel lane, thus requiring temporary detours for motor vehicle, bicycle and pedestrian traffic. Detours can be accommodated within the existing street widths, and will not require re-routing of traffic.

Traffic control barricades, cones, signage and lighting will be used as necessary to alert drivers and delineate construction boundaries. Approach signs and a flag person will be positioned to direct traffic through temporary traffic control zones as necessary.



LEGEND

PROJECT LOCATION

FIGURE 10
ROADWAY AND COMMUNITY MAP
Kaipapaʻu Stream Bridge Replacement
Koʻolauloa District, Oʻahu, Hawaiʻi

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To minimize traffic impacts to nearby residents, the contractor will schedule heavy truck activity as much as possible between the hours of 9:00 a.m. and 3:00 p.m. on weekdays. Work on weekends will also be avoided to minimize traffic disruptions. The HPD will be notified prior to periods of heavy truck activity or during transport and operation of heavy equipment.

The proposed project is expected to have short-term impacts in the form of traffic slow-downs as previously described. The project will also result in a temporary increase in vehicle trips attributable to workers traveling to and from the work site, and the use of construction vehicles during the course of work. All construction-related traffic impacts are temporary, however, and will cease upon project completion.

Short-term construction-related impacts will be mitigated by restricting the hours of construction vehicle activity to non-peak traffic periods, and by use of traffic control measures as previously described. All traffic control measures will be designed to minimize impacts on continued traffic flow. With the proposed mitigation measures in place, significant short-term adverse impacts to traffic are not anticipated.

To minimize traffic impacts to nearby residents, the contractor will schedule heavy equipment activity between the hours of 9:00 a.m. and 3:00 p.m. on weekdays and will suspend activity on weekends and State holidays. If necessary, HPD will be notified prior to periods of heavy equipment activity or during transport and operation of heavy equipment. Approach signs will be installed to direct traffic. Two-lane traffic will be maintained during the course of the project.

6.4.2 PEDESTRIAN AND BICYCLE ACCESS

The rural setting, beautiful scenery, and mild climate of the Hauʻula area make it well suited for walking and bicycling. Kamehameha Highway provides the primary transportation corridor in the area and, as the only direct route around the windward side of Oʻahu, is used daily by local residents, commuters, and visitors. Though traffic on the Kamehameha Highway consists primarily of automobiles and tour buses, area residents also transit the route on foot, bicycle, and occasionally by horse. The route is also popular among bicyclists.

In the vicinity of the project site, the Kamehameha Highway has six-foot wide striped, paved shoulders going in both directions, however, the existing bridge crossing has no shoulder or sidewalk area. To safely accommodate pedestrian and bicycle traffic, the proposed bridge will provide two five-foot wide sidewalks/ bike lanes.

Potential Impacts and Mitigation

During construction, the existing pedestrian access will be demolished. Temporary pedestrian and bicycle access will be provided during the duration of construction. With the proposed mitigation measures in place, significant short-term adverse impacts to pedestrian and bicycle traffic are not anticipated.

CHAPTER 7

RELATIONSHIP TO LAND USE POLICIES AND CONTROLS OF THE AFFECTED AREA

7.1 OVERVIEW

Federal, State and County policy plans and land use plans and controls are established to guide development in a manner that enhances the overall living environment of Hawai'i, and ensure that the long-term social, economic, environmental, and land use needs of the people of Hawai'i are met.

The use of the site to replace the existing bridge is in accordance with State and County land use plans and policies, as discussed below.

7.2 NATIONAL HISTORIC PRESERVATION ACT (NHPA), SECTION 106 REVIEW AND CONSULTATION

The use of Federal funds and the requirement of Federal permits for the project triggers the need for NHPA Section 106 compliance; Federal involvement in the project subjects the project to the NHPA Section 106 process. The purpose of the NHPA Section 106 review process is to evaluate the potential for effects on existing historic sites, if any, resulting from the project. Findings relating to historic properties were discussed previously in **Section 5.4.**

The NHPA Section 106 review process encompasses a "good faith effort" in ascertaining the existence and location of historic properties near and within the project site, establishing an Area of Potential Effects (APE) of the project, identifying whether a potential for "adverse effects" on historic properties by the project exists, and developing a reasonable and acceptable resolution in the monitoring and treatment of any historic sites that is agreed upon by the agency, Hawai'i State Historic Preservation Officer (SHPO) (State of Hawai'i, Department of Land and Natural Resources, (SHPD), and consulting government agencies, community associations, and native Hawaiian organizations and families. The APE of the project is an area approximately 40 feet offset from the existing bridge structure and a 15-foot corridor following the alignment of the new stream wall location.

A Section 106 Consultation was undertaken for the proposed project. The SHPO concluded that the project will have no adverse effect to historic properties provided that the existing bridge be photographed before demolition. See **Appendix E, State Historic Preservation Division Correspondence**. A list of individuals and organizations contacted during the Section 106 process is also included in **Appendix E**.

Should historical or cultural materials be discovered during ground disturbing activities, work in the area will cease immediately and the SHPD will be notified of the discovery and consulted as to the appropriate course of action. Burial finds will be treated in accordance with HAR, 12-300 and HRS 6E-43.6. The SHPD will determine the appropriate treatment of the remains and any associated historical or cultural material in consultation with recognized descendants, if any, and the O‘ahu Island Burial Council.

7.3 ENVIRONMENTAL JUSTICE

This aspect of environmental activism and regulation broadens the scope of the traditional Environmental Movement, in general, and redefines the term "environment" to include places where people live, work, pray, play, and go to school. A significant federal response to ongoing advocacy and organizing efforts is former President Clinton's Executive Order 12898, issued in 1994. Because communities that have large populations of people of color are the ones most impacted by disproportionate environmental problems, the Executive Order aimed to prevent environmental racism under Title VI of the 1964 Civil Rights Act. Title VI prohibits discrimination on the basis of race, color or national origin. It also prohibits recipients of federal funds, including federal and state agencies, from discriminatory actions.

The federal Environmental Protection Agency (EPA) states that environmental justice means "fair treatment." As defined by the EPA, "Fair treatment means that no groups of people, including racial, ethnic or socioeconomic groups, should bear a disproportionate share of negative environmental consequences from industrial, municipal, and commercial operations, or the execution of federal, state, local, and tribal programs and policies."

The proposed bridge replacement and widening project is considered an improvement to a regional facility and will benefit a large segment of the population. The decision to replace this bridge was not biased by race or income, rather, the decision was made based on the fact that the bridge currently does not meet roadway standards. As part of the environmental review process, the SDOT consulted with neighborhood groups, organizations and individuals prior to finalizing plans.

7.4 SECTION 4(f)

The purpose of Section 4(f) of the Department of Transportation Act (49 U.S.C. 303 and 23 U.S.C. 138) is to preserve parkland, recreation areas, wildlife refuges, and historic sites by limiting the circumstances under which such land can be used for transportation programs or projects. Section 4(f) permits the use of land for a transportation project from a significant publicly owned park, recreation lands, wildlife or waterfowl refuge, or any significant historic site only when FHWA and the Urban Mass Transportation Administration has determined that (1) there is no feasible and prudent alternative to such use, and (2) the project includes all possible planning to minimize harm to the property resulting from such use.

The proposed project does not impact sites within the jurisdictional authority of Section 4(f).

7.5 STATE OF HAWAI'I

7.5.1 State Plan

The State Plan, adopted in 1978, consists of three parts:

(1) an overall theme together with broad goals, objectives, and policies;

(2) a system designed to coordinate public planning to implement the goals, objectives, and policies of the State Plan; and

(3) priority guidelines which are statements of Statewide interrelated problems deserving immediate attention.

Three broad goals in the areas of the economy, the physical environment, and the physical, social and economic well-being of the people express the ideal end-states of the State Plan.

The bridge replacement and widening project supports the State Plan's general objectives and policies for a modern, statewide transportation system.

The proposed bridge replacement and widening will be financed under the Federal Aid Highway Program with 80 percent of the funds contributed by the Federal Department of Transportation and 20 percent contributed by the State of Hawai'i. Community needs, environmental concerns and cultural resources are considered in the Environmental Assessment and design process.

7.5.2 State Functional Plans

The State functional plans are intended to provide more detail to the State Plan. They serve to guide State and County actions under specific functional topics of governance. The functional plans relevant to the bridge replacement and widening project are the Transportation Plan and Tourism Plan. Applicable objectives and policies from these plans are discussed below.

<u>Transportation</u>

<u>Objective I.A:</u> Expansion of the transportation system.

<u>Policy I.A.1:</u> Increase transportation capacity and modernize transportation infrastructure in accordance with existing master plans.

The bridge replacement and widening is being proposed to upgrade the transportation infrastructure standards on the Kamehameha Highway and improve roadway safety. The project is being conducted in compliance with existing state and county master plans and land use ordinances.

Tourism

> Objective II.A: Development and maintenance of well-designed visitor facilities and related developments which are sensitive to the environment, sensitive to neighboring communities and activities, and adequately serviced by infrastructure and support services.

The Bridge replacement and widening is consistent with this objective in ensuring a safe transportation infrastructure for visitors traveling on the Kamehameha Highway. Potential social and environmental impacts are being addressed through the environmental assessment process.

7.5.3 State Land Use Commission

The State Land Use Commission classifies all lands in the State of Hawaiʻi into one of four land use designations: Urban, Rural, Agricultural, and Conservation. The Kaipapaʻu Stream Bridge is located within the State Urban District. **See Figure 11, State Land Use**

7.5.4 Coastal Zone Management Program Assessment and Federal Consistency Determination

A project needing any federal permit or license may require an assessment and review for consistency with Hawaiʻi's CZM Program. A project requiring a permit specifically from the Army Corps of Engineers requires this assessment and review for consistency. Federal activities, including projects financially-assisted by the federal government, that directly affect Hawaiʻi's coastal zone, including all land, waters and marine waters, require reviews for consistency with Hawaiʻi's CZM Program.

The CZM program assessment and federal consistency determination is regulated under Section 307 (§ 1456) – *Coordination and Cooperation* of the National Coastal Zone Management Act (NCZMA) of 1972, as amended (16 USC 1451, et seq); HRS Section 205A-3(3), "the lead agency shall review federal programs, federal permits, federal licenses and federal development proposals for consistency with the coastal zone management program;" and Code of Federal Regulations (CFR), Title 15, Part 930 – *Federal Consistency with Approved Coastal Management Programs*, U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA).

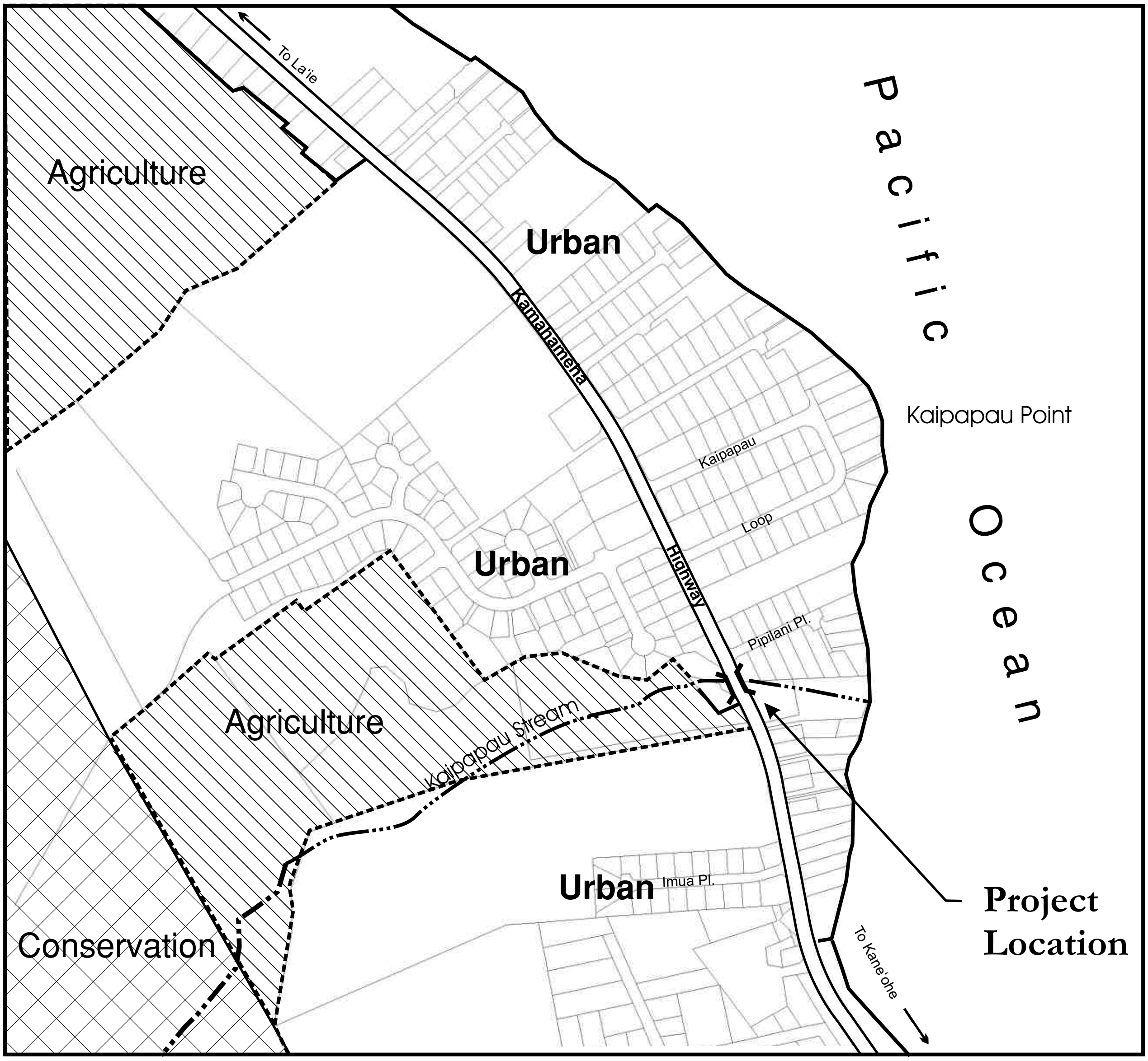

FIGURE 11
STATE LAND USE MAP
Kaipapa‘u Stream Bridge Replacement
Ko‘olauloa District, O‘ahu, Hawai‘i

0 1000 Feet 2000

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This project occurs in a coastal zone and is partially funded by the federal government – Federal Highway Administration (FHWA); thus, a review of project work for its consistency with Hawai'i's CZM Program will be conducted. NCZMA Section 307(C) requires a determination of consistency with CZM Act for this project before project approval. Therefore, the responsible agency – SDOT-H – will make the consistency determination and request concurrence from the State CZM Program administered by DLNR – OP – CZM.

Pursuant to Chapter 205A, Hawai'i Revised Statutes, actions proposed within the SMA are evaluated with respect to SMA objectives, policies and guidelines. This section addresses the proposed action as related to applicable coastal zone management considerations, as set forth in HRS, Chapter 205A.

7.5.4.1 Recreational Resources

Objective: Provide coastal recreational opportunities accessible to the public.

Policies:

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

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

- (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;
- (ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;
- (iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;
- (iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;
- (v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

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

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

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

Response: The proposed project is not anticipated to adversely impact existing shoreline recreational activities or coastal access ways.

7.5.4.2 Historic Resources

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

Policies:

(A) Identify and analyze significant archaeological resources;

(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and

(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: The proposed reconstruction of the Kaipapa'u Stream Bridge structure will be completed in keeping with the guidelines and objectives of the aforementioned objective and policies. Plans for reconstruction of the bridge have been designed to improve public safety while preserving the historic nature of the area.

7.5.4.3 Scenic and Open Space Resources

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

Policies:

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

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

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

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

Response: The proposed project will not impact shoreline views or open space resources. Shoreline open space and scenic resources will be preserved.

7.5.4.4 Coastal Ecosystems

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

Policies:

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

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

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

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

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

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

7.5.4.5 Economic Uses

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

Policies:

(A) Concentrate coastal dependent development in appropriate areas;

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

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

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

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

7.5.4.6 Coastal Hazards

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

Policies:

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and non-point source pollution hazards;

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and non-point source pollution hazards;

(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

(D) Prevent coastal flooding from inland projects.

Response: No short-term impacts are anticipated during construction-related activities. Appropriate erosion control measures designed to minimize soil loss and erosion will be utilized, and proposed improvements will be designed to conform with all applicable flood requirements. The new bridge will be designed to withstand the effects of flooding during 100-year storm events.

7.5.4.7 Managing Development

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

Policies:

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

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

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

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

7.5.4.8 Public Participation

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

Policies:

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

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

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

Response: As previously noted, public awareness of the project is being promoted through the Environmental Assessment process, as well as the County's SMA permitting and review process.

Copies of the Preliminary Draft EA were sent to individuals and organizations in the area to solicit comments regarding the project (see **Section 9.4**). In addition, a public information meeting was held at Hau'ula Elementary School on August 15, 2006 to discuss the proposed project with area residents. A presentation of the project was also made to the Ko'olauloa Neighborhood Board meeting on September 14, 2006. See **Appendix F, Public Consultation**.

The SDOT shall make available, during all phases of construction, a public outreach person to provide the general public with information about the project activities and to answer and/or resolve concerns regarding the project construction from the general public. The SDOT shall publicize and maintain a telephone "hotline" to facilitate this process. The proposed project is not contrary to the objectives of public awareness, education and participation.

7.5.4.9 Beach Protection

Objectives: Protect beaches for public use and recreation.

Policies:

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

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

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

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

7.5.4.10 Marine Resources

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

Policies:

(A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

(B) Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

(C) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

(D) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean and coastal resources; and

(E) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

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

7.5.5 National Pollutant Discharge Elimination System Permit

DOH is delegated by the EPA to administer the NPDES Permit program in Hawai'i. The NPDES permit program is described in and administered through HAR, Chapter 11-55 – *Water Pollution Control*.

The SDOT-H will submit Notice of Intent (NOI) forms for review approval by DOH in order to obtain a Notice of General Permit Coverage (NGPC) prior to the commencement of project construction work. Different types of discharges will require different NOI forms.

The NPDES Permit is regulated under CWA et seq, HRS Chapter 342D, 40 CFR Parts 122 to 125 and HAR, 11-55.

7.5.6 CWA Section 401 Water Quality Certification

Water Quality Certification (WQC) pursuant to the Federal Clean Water Act of 1977 et seq, Section 401 is required of any applicant for a federal license or permit to conduct any activity in state waters that would include, but not be limited to, the construction or operation of facilities that may result in any discharge into the navigable waters. The applicant must provide the licensing or permitting agency with a certification from the state in which the discharge originates or will originate.

Section 401 WQC is regulated under the CWA, HRS Chapter 342D – *Water Pollution* and HAR, Chapter 11-54 – *Water Quality Standards*.

The project involves work in state waters and in a coastal area adjacent to federal navigable waters below the mean high water mark, and requires a 404 CWA federal permit; thus, the project requires a 401 WQC. An application for 401 WQC will be prepared for this project.

7.5.7 Stream Channel Alteration Permit (SCAP)

Stream channels are protected by law from alteration, whenever practicable, to provide for fishery, wildlife, recreational, aesthetic, scenic and other beneficial in-stream uses. No stream channel can be altered until an application for a SCAP to undertake the work has been filed and a permit has been issued by the Commission on Water Resource Management (CWRM).

The SCAP is regulated by HAR, Title 13, Subtitle 7, Chapter 169 – *Protection of Instream Uses of Water* and HRS 174C – *State Water Code*.

The project involves a number of tasks that affect the condition of the stream; thus, a SCAP is required by the project.

7.6 CITY AND COUNTY OF HONOLULU

7.6.1 General Plan

The General Plan for the City and County of Honolulu, updated in 1994, provides a statement of the long-range social, economic, environmental, and design objectives for the general welfare and prosperity of the people of Oʻahu. Using a 20-year time horizon, broad policies are also specified to facilitate attainment of the objectives of the Plan. The proposed Kaipapaʻu Stream Bridge replacement and widening will be consistent with the following policy of the General Plan:

<u>Transportation</u>

<u>Objective:</u> To support an advanced and environmentally sensitive transportation system, which will enable people and goods to move safely, efficiently, and economically.

The proposed bridge replacement and widening will provide a safe highway crossing over Kaipapaʻu Stream and mitigate maintenance and safety concerns attributable to the substandard and declining condition of the existing bridge.

Objective: To maintain transportation and utility systems which will help O‘ahu. continue to be a desirable place to live and visit.

The proposed bridge replacement and widening will result in upgraded transportation systems for the Hau‘ula region and will be used tourists visiting this part of the island, such as the Polynesian Cultural Center.

7.6.2 Special Management Area

The SMA is land extending inland from the shoreline, as established in Revised Ordinance of Honolulu (ROH) Chapter 25 – *Special Management Area*, and delineated on the SMA maps adopted by the City and County of Honolulu, City Council. The SMA maps are located at the Honolulu City Council and Department of Planning and Permitting (DPP) offices. The SMA Permit covers any uses, activities or operations that are defined as being part of “development” within the SMA. Uses, activities and operations not considered to be associated with “development” are exempt from SMA requirements. The definition of “development” and exemptions are contained in ROH Chapter 25.

Any “development” - related uses, activities or operations within the SMA requires either an SMA *Minor* Permit or an SMA Use Permit (SMP), depending on the total cost and environmental impact of the proposed project. Generally, an SMA Minor Permit may be processed if the total cost of the proposed development is less than $125,000 and will have no substantial adverse environmental or ecological impacts. If the project has a total value that exceeds $125,000 and/or results in substantial adverse impacts, including potential cumulative impacts, on the environment, and SMP (SMA *Major* Permit) is required.

The SMA Use Permit is regulated under HRS Chapters 205A and 343; ROH Chapter 25; and the DPP document, *Rules Relating to Shoreline Setbacks and the Special Management Area* et seq.

An SMA map of the region encompassing the project site is attached for reference as **Figure 12, Special Management Area**.

7.6.3 Koʻolauloa Sustainable Communities Plan

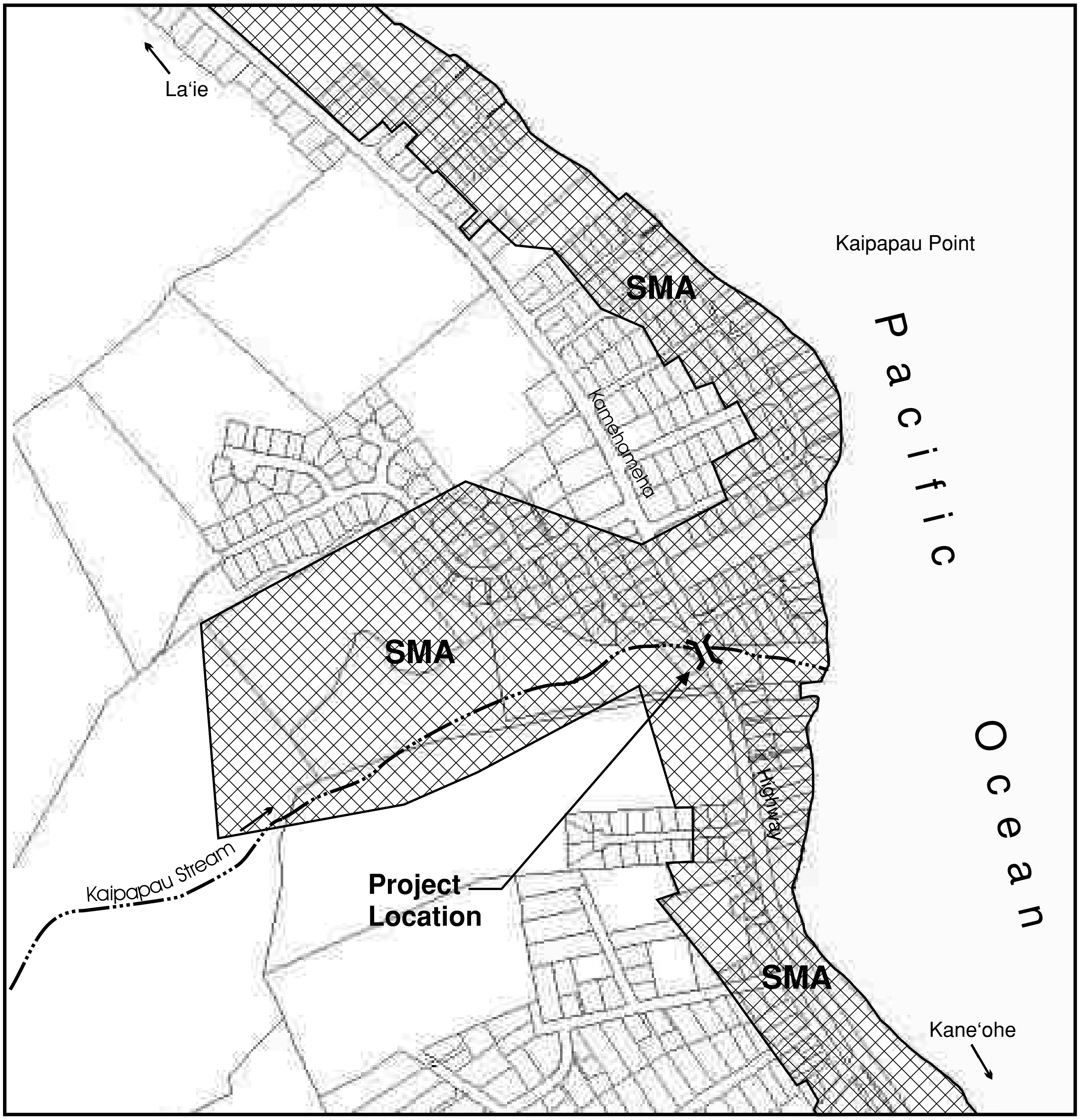
The development plans and sustainable community plans for the City and County of Honolulu are mandated by the General Plan to address the goals, objectives and policies of the County General Plan for each of Oʻahu's districts. Hauʻula is in the Koʻolauloa district and is therefore included in the Koʻolauloa Sustainable Communities Plan, which was updated in 1999 and adopted by the Honolulu City Council as Ordinance 99-72.

The project location is shown in the Koʻolauloa Sustainable Communities Plan Land Use Map as contained within a single family residential neighborhood and nearby a commercial area. This is consistent with zoning for the surrounding area. See **Figure 13, Koʻolauloa Sustainable Communities Plan**.

The proposed Kaipapaʻu Stream Bridge replacement and widening will be consistent with the following general policy of the Koʻolauloa Sustainable Communities Plan:

> To retain Koʻolau Loa as a predominantly rural area with limited future growth, its transportation should provide:
>
> 1. Adequate access for all communities, shopping and recreation areas in Koʻolau Loa.
> 2. Roadway improvements, developed in consultation with Koʻolau Loa communities, which emphasize highway safety as the highest priority while providing efficient, pleasant travel experiences.
> 3. Adequate capacity for peak travel to and from community centers.

The SDOT consulted with neighborhood groups, organizations and individuals prior to finalizing plans. The proposed project will improve an existing facility in need of replacement. The new bridge will promote increased highway safety for vehicular and pedestrian users.



LEGEND

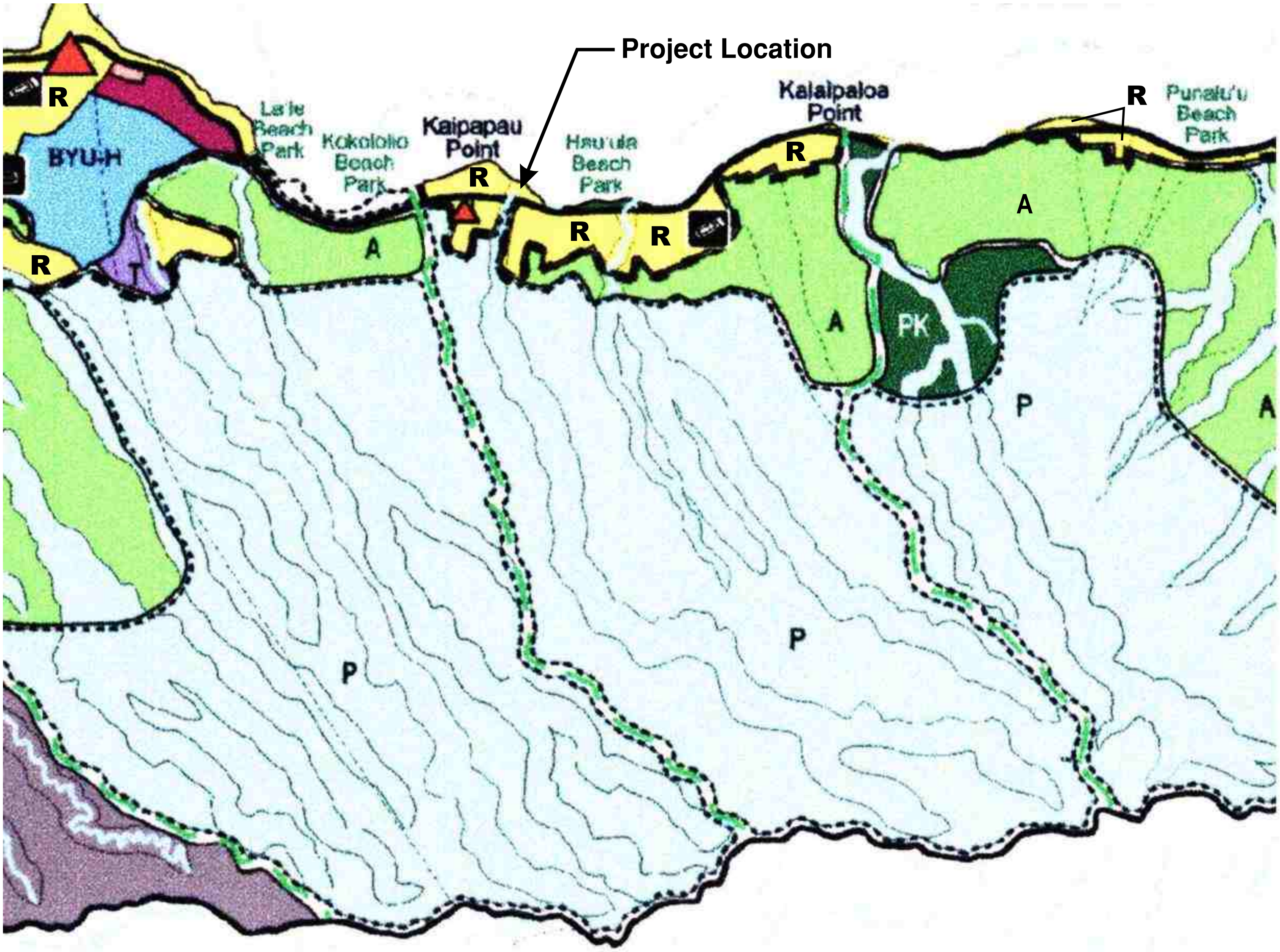
SMA Boundary

Source: HOLIS, City and County of Honolulu
Geographic Information System, 2003

FIGURE 12
SPECIAL MANAGEMENT AREA
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

0 1000 Feet 2000

R. M. TOWILL CORPORATION February 2007



LEGEND

A AGRICULTURE

P PRESERVATION

PK PARK

R RURAL RESIDENTIAL

FIGURE 13
Ko'olauloa Sustainable Community Plan
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

0 1000 Feet 2000

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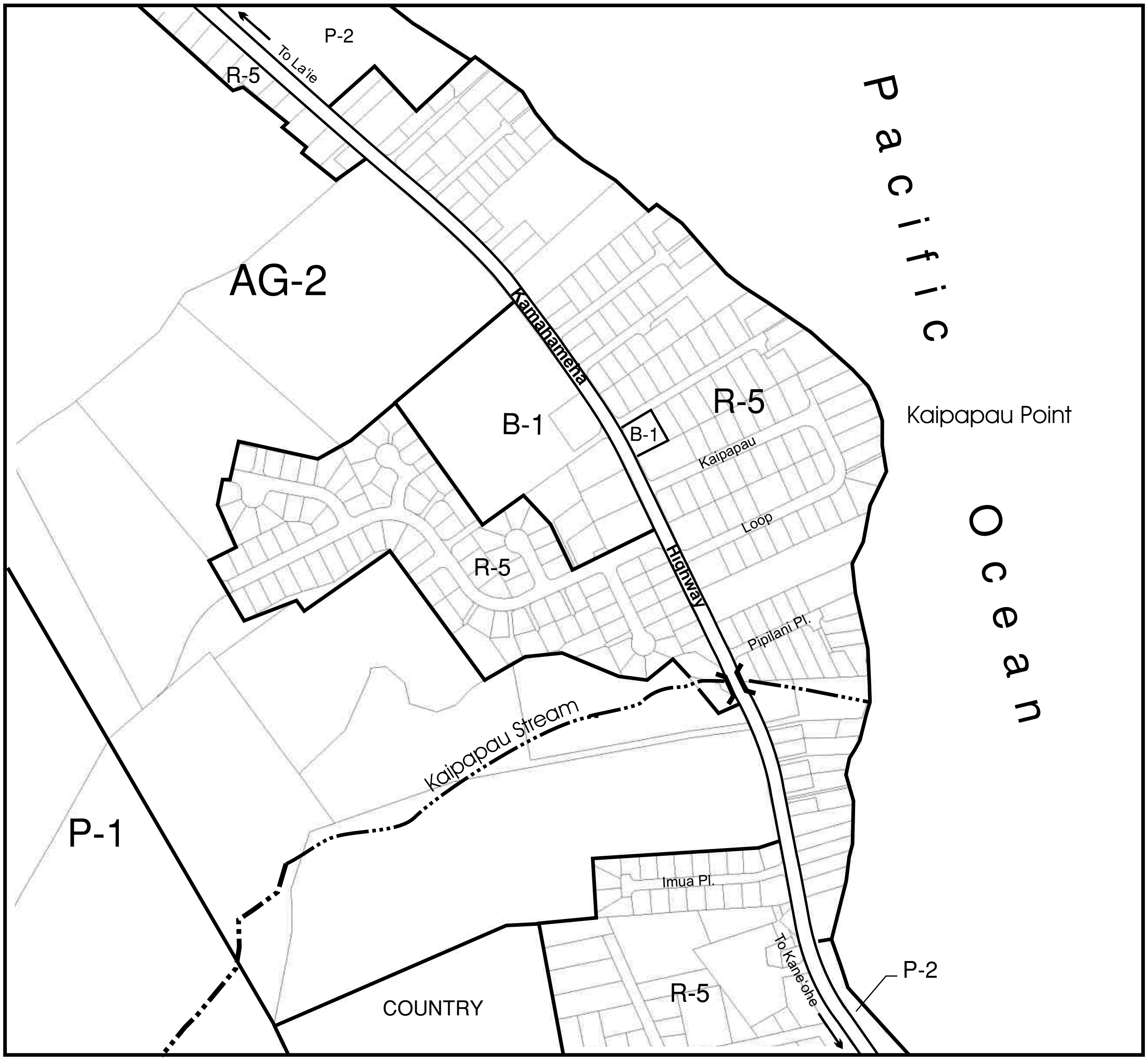
7.6.4 Zoning

The predominant land use in the area is agriculture, consisting mainly of cattle ranching, taro production and other diversified farming activities. Agricultural zoning standards have also permitted the subdivision of agricultural lands.

The land surrounding the project site is a patchwork of privately-owned parcels zoned R-5 residential by the City and County of Honolulu. See **Figure 14, Zoning Map.**



LEGEND

AG-2 – General Agricultural District.
B-1 – Business, 5,000 sf min. Lot area.
P-1 – Restricted Preservation District.
P-2 – General Preservation District.
R-5 – Residential District, 5,000 sf min. Lot area.

FIGURE 14
ZONING MAP
Kaipapa‘u Stream Bridge Replacement
Ko‘olauloa District, O‘ahu, Hawai‘i

R. M. TOWILL CORPORATION February 2007

CHAPTER 8

NECESSARY PERMITS AND APPROVALS

8.1 FEDERAL

- Department of the Army Nationwide Permit, No. 33 - Temporary Construction, Access, and Dewatering

Required under Section 404 of the Clean Water Act, as construction of the improved bridge will require construction activities below the high water mark as defined by the Corps of Engineers.

8.2 STATE OF HAWAIʻI

8.2.1 Department of Health

- Water Quality Certification, Section 401 of the Clean Water Act

Required for potential discharges into waters of the United States. The DOH-Clean Water Branch will coordinate this permit with the Department of the Army's Nationwide Permit.

- National Pollution Discharge Elimination System (NPDES)

DOH is delegated by the EPA to administer the NPDES Permit program in Hawaiʻi. The NPDES permit program is described in and administered through HAR, Chapter 11-55 – *Water Pollution Control*. The SDOT-H will submit Notice of Intent forms Construction Storm Water (NOI, Form C), Hydrotesting Discharge (NOI, Form F) and Construction Dewatering (NOI, Form G) for review and approval by DOH in order to obtain a Notice of General Permit Coverage (NGPC) prior to the commencement of project construction work.

8.2.2 Department of Land and Natural Resources (DLNR)

- Stream Channel Alteration Permit (SCAP)

The SCAP will be required for the project according to DLNR, Commission on Water Resource Management. A permit application will be filed with the Commission.

· Section 106 of the National Historic Preservation Act, Consultation

Section 106 requires consultation with the SHPD, Native Hawaiian Organizations and the public to determine if historic properties will be impacted by the project. Further, if historic properties are encountered, appropriate mitigation shall be proposed in consultation with identified parties. Also see **Appendix E, State Historic Preservation Division Correspondence**.

8.2.3 State of Hawai'i, Office of Planning

· Federal Coastal Zone Management (CZM) Consistency Review

Review from the Office of State Planning is required in conjunction with the Department of the Army Section 404 Permit.

8.3 CITY AND COUNTY OF HONOLULU

The City and County of Honolulu, Department of Planning and Permitting, was contacted for guidance regarding zoning issues. On the Ko'olauloa Sustainable Communities Plan Land Use Map, the Kaipapa'u Stream Bridge is located within lands designated as Urban. County zoning in the area is Residential (R-5).

· Special Management Area Major Permit

Required under the Revised Ordinance of Honolulu (ROH) Chapter 25. A SMA Major permit application will be filed with the Department of Planning and Permitting.

8.4 PRIVATE ENTITIES

The State Department of Transportation, Highways Division and project contractor will obtain a right-of-entry from the surrounding land owners prior to conducting any site reconnaissance or construction activities.

CHAPTER 9

ORGANIZATIONS, AGENCIES AND STAKEHOLDERS CONSULTED OR TO BE CONSULTED DURING PREPARATION OF THE DRAFT EA

9.1 FEDERAL AGENCIES

U.S. Department of Transportation - Federal Highway Administration
U.S. Army Corps of Engineers, Honolulu Engineer District
U.S. Department of Agriculture - Natural Resource Conservation Service
U.S. Department of the Interior - Fish and Wildlife Service
National Oceanic and Atmospheric Administration - National Marine Fisheries Service

9.2 STATE AGENCIES

Department of Accounting and General Services
Department of Business, Economic Development, & Tourism
- Hawaiʻi Coastal Zone Management Program

Department of Health
- Clean Water Branch
- Environmental Planning Office
- Noise and Radiation Branch
- Office if Environmental Quality Control

Department of Land and Natural Resources
- Commission on Water Resource Management
- Division of Aquatic Resources
- Division of State Parks
- State Historic Preservation Division
- Land Division

Department of Transportation - Highways Division
Hawaiian Homes Commission
Office of Environmental Quality Control
Office of Hawaiian Affairs
University of Hawaiʻi
- Environmental Center
- Ethnic Studies Department

9.3 CITY AND COUNTY OF HONOLULU

Board of Water Supply
Department of Design and Construction
Department of Environmental Services
Department of Planning and Permitting
Honolulu Fire Department
Honolulu Police Department
Koʻolauloa Neighborhood Board

9.4 INDIVIDUALS AND PRIVATE ORGANIZATIONS

Ahahui Kaʻahumanu Society
Association of Hawaiʻi Civic Clubs
Hauʻula Community Association
Hawaiian Electric Company
Hawaiian Historical Society
Historic Hawaiʻi Foundation
Hui Malama I Na Kupuna O Hawaiʻi Nei
Kaʻaʻawa Community Association
King Kamehameha Hawaiian Civic Club
Koʻolauloa Hawaiian Civic Club
Koʻolauloa Interagency Community Council
Native Hawaiian Advisory Council
Native Hawaiian Protocol & Consultant Service
Punaluʻu Community Association
Royal Order of Kamehameha
State Council on Hawaiian Heritage
The Friends of Iolani Palace
The Outdoor Circle
Afalava/Tanoai Family
Mr. & Mrs. Bangert
Ms. Elizabeth Buckle
Mr. Glen Christensen
Mr. Chris Guerrero
Mr. & Mrs. Mervyn Kotake

Mr. & Mrs. Bruce Nichol

Mr. Nick Pao

9.5 ELECTED OFFICIALS

State Senator Clayton Hee

State Representative Colleen Meyer

City Council Member Donovan Dela Cruz

CHAPTER 10

DETERMINATION

10.1 OVERVIEW

In accordance with the provisions set forth in Chapter 343, Hawai‘i Revised Statutes, and in Section 11-200-12 of Title 11, Chapter 200, Hawai‘i Administrative Rules, the proposed Kaipapa‘u Stream Bridge replacement and widening has been assessed for short- and long-term and cumulative effects on the environment.

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

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

10.2 SIGNIFICANCE CRITERIA

Significance criteria set forth in Section 11-200-12 of Title 11, Chapter 200 HAR were used to evaluate the potential impacts of the proposed project on the environment. The thirteen criteria are listed below along with the determination of significance.

Criterion 1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;

An assessment of flora and fauna, and historic and archaeological sites at and near the project area found no presence of natural or cultural resources that would be jeopardized by the proposed bridge improvement.

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

Criterion 2. Curtails the range of beneficial uses of the environment;

The proposed project site is located primarily within the existing traffic corridor. Some encroachment on adjoining land will not displace any structures or activities and would not detract from the function or use of the remaining area of those parcels. The improved bridge would not significantly alter the existing use of the environment. The commitment of land necessary for the bridge replacement and widening is not anticipated to curtail the range of beneficial uses of the environment.

Criterion 3. Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS;

The project proposal has been prepared according to State and County guidelines, plans, and policies and has been found to be in compliance with all relevant provisions.

Criterion 4. Substantially affects the economic or social welfare of the community or State;

The proposed bridge replacement and widening is expected to have little effect on the social and economic environment. In general, the expansion will serve to meet level of service needs and safety standards for transportation infrastructure required by area residents, businesses, and visitors. There are no adverse long-term economic or social welfare impacts anticipated as a result of project implementation.

Criterion 5. Substantially affects the public health;

Factors affecting public health, including air quality, water quality, and noise levels were assessed according to various project scenarios and determined to be only minimally affected or unaffected by the construction and use of the replacement bridge. Appropriate mitigation measures for short-term impacts are expressed in Best Management Practices to be followed by the project contractor.

Criterion 6. Involves substantial secondary impacts, such as population changes or effects on public facilities;

The proposed project will not, itself, stimulate unexpected change in the population, but will accommodate current and future vehicle use associated with economic and social activities in the area.

Criterion 7. Involves a substantial degradation of environmental quality;

Analysis of air and water quality, noise levels, and land use associated with the construction and use of the improved bridge has determined that the proposed project will not substantially degrade environmental quality. During project implementation, appropriate environmental mitigation measures will be utilized to ensure that potential adverse environmental effects are mitigated.

Criterion 8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

The proposed project is being developed as part of the State's ongoing effort to modify or replace structurally deficient bridges to meet current standards for roadway safety and design.

The proposed replacement and widening is a component of the State's commitment to maintain a safe and efficient transportation infrastructure, but will not, of itself, involve a commitment for larger actions. The proposed project is not anticipated to create or contribute to any significant long-term environmental effects.

Criterion 9. Substantially affects a rare, threatened, or endangered species, or its habitat;

An investigation of flora and fauna in the project vicinity discovered no species that are listed as threatened or endangered by the State or Federal government. Due to its rural location, Kaipapaʻu Stream has relatively clean water and native aquatic species are known to inhabit the stream. Appropriate Best Management Practices will be implemented to mitigate possible negative effect of the proposed bridge replacement. The stream bed and banks adjacent to the project site have been overgrown with introduced grass species. The proposed project will provide the opportunity to remove the growth within the stream. Given the scale and location of the bridge reconstruction, the existing habitat or natural environment within the project site is not anticipated to be adversely affected by the proposed project.

Criterion 10. Detrimentally affects air or water quality or ambient noise levels;

Analysis of air and water quality, and ambient noise levels associated with the construction and use of the new bridge have determined that effects to these environmental measures will be minimal or temporary. Appropriate environmental mitigation measures will be implemented during project construction to ensure that potential for adverse environmental impacts on air quality and ambient noise levels are minimized.

Criterion 11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;

The project site is located inland from any coastal waters within an area determined by the Federal Emergency Management Agency to be at risk of flooding. The proposed replacement bridge will be designed to withstand effects of flooding from 100-year storm events. All structures proposed for this project will be built according to standards for seismic zone 2, as established by the Uniform Building Code. The project is not anticipated to affect or suffer damage from natural forces.

Prior to construction activities, a Department of the Army Section 404 permit will be required. In addition, a Stream Channel Alteration Permit (SCAP) from the DLNR, Commission on Water Resource Management will be required, as will a Water Quality Certification from DOH. Through governmental guidance and implementation of said permitting requirements, parameters of the proposed project will be such that the potential for adverse impacts is minimized. Further, use of appropriate BMP's during construction will also reduce potential for adverse impacts to water quality.

Criterion 12. Substantially affects scenic vistas and view planes identified in County or State plans or studies;

The project site is not located within any scenic vista or view plane identified in County or State Plans. The appearance of the new bridge would differ in appearance from the existing bridge in the materials used and in its wider dimensions. The difference would be noticeable to drivers in the form of a visually broader roadway and sturdier bridge railings. The supporting structure would be visible only to those on foot or on adjacent government roads and would not detract significantly from existing views. Visual impacts associated with construction activities will be temporary.

The proposed project is not anticipated to adversely impact scenic vistas or view planes in the project vicinity. In addition, the reconstruction designs are intended to preserve the visual character of the Kaipapa‘u Stream Bridge.

Criterion 13. Requires substantial energy consumption.

Construction activities associated with the bridge replacement and widening would require high, short-term energy use, however, the project would prevent energy consumption associated with ongoing maintenance activities necessary to sustain the useful life of the existing bridge.

The short-term energy demand is not considered substantive or excessive within the context of the region's overall energy consumption. In the long-term, the project is not anticipated to create additional demands for energy consumption.

10.3 FINDINGS

In accordance with the provisions set forth in Chapter 343, Hawaiʻi Revised Statutes, and the significance criteria in Section 11-200-12 of Title 11, Chapter 200, this assessment has determined that the project will have no significant adverse impact to water quality, air quality, existing utilities, noise levels, social welfare, archaeological sites, or wildlife habitat. All anticipated impacts will be temporary and will not adversely impact the environmental quality of the area.

It has been determined that an Environmental Impact Statement (EIS) will not be required, and that a Finding of No Significant Impact (FONSI) has been issued for this project.

REFERENCES

AECOS, Inc., *Kaipapa' u Stream Bridge Replacement Application for Section 401 Water Quality Certification, TMK 2-7-13:8 (por.) and 31 (por.),* Hau'ula, O'ahu, Hawai'i, 2003.

City and County of Honolulu, 1999. *Ko'olauloa Sustainable Communities Plan, City and County of Honolulu*. Honolulu, Hawai'i.

City and County of Honolulu, Department of Planning and Permitting, Zoning Map.

Spencer Mason Architects, Inc. 1996. *State of Hawai'i, Historic Bridge Inventory and Evaluation*. Honolulu, Hawai'i.

State of Hawai'i, Department of Transportation, Highways Division, Bridge Design Section, Unit "B" Design Branch. May 2000. *Project Assessment Report, Kamehameha Highway, Kaipapa'u Stream Bridge Replacement, M.P. 20.99.* Honolulu, Hawai'i.

State of Hawai'i, Department of Transportation - Highways Division, October 1997, *Bridge Inspection Report*.

State of Hawai'i, Department of Transportation, 2000. *Kamehameha Highway, Kaipapa'u Stream Bridge Replacement, M.P. 20.99.* Honolulu, Hawai'i.

State of Hawai'i, Department of Transportation, October 2005. *Kamehameha Highway, Kaipapa'u Stream Bridge Replacement, Pre-Conceptual Design Report.* Honolulu, Hawai'i.

State of Hawai'i, Department of Business, Economic Development and Tourism, Land Use Commission.

State of Hawai'i, Department of Business, Economic Development & Tourism (DBEDT), *The State of Hawai'i Data Book, 200*0, Honolulu, Hawai'i. http://www.hawaii.gov/dbedt/db00/sec01.html

U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, O'ahu, Mau'i, Molokai, and Lana'i, State of Hawai'i*, with University of Hawai'i Agricultural Experiment Station, August 1972.

U.S. Department of Commerce, Bureau of the Census, *2000 Census of Population and Housing, Hawai'i,* Washington, D.C., 2001.

U.S. National Park Service Western Region Natural Resources and Research Division Hawaiʻi Cooperative Park Service Unit, *Hawaiʻi Stream Assessment - A Preliminary Appraisal of Hawaiʻi's Stream Resources Report R84,* Prepared for the State of Hawaiʻi Department of Land and Natural Resources Commission on Water Resource Management, December 1990.

U.S. Department of Commerce, Bureau of the Census. 2001. *2000 Census of Population and Housing, Hawaiʻi,* Washington, D.C.

U.S. Department of Agriculture, Soil Conservation Service, with University of Hawaiʻi Agricultural Experiment Station. August 1972. *Soil Survey of Islands of Kauai, Oʻahu, Mauʻi, Molokai, and Lanaʻi, State of Hawaiʻi*. Honolulu, Hawaiʻi.

World Climate, Hauʻula Weather Station
http://www.worldclimate.com/cgi-bin/data.pl?ref=N21W157+2200+511271C

World Conservation Union, The IUCN Red List of Threatened Species. 2005.
http://www.iucnredlist.org/search/details.php?species=44167

Appendix A

Traditional Cultural Practices Assessment
for the Kaipapa‘u Bridge Replacement,
Kaipapa‘u Ahupua‘a, Ko‘olauloa District, O‘ahu

Cultural Surveys Hawai‘i

TRADITIONAL CULTURAL PRACTICES ASSESSMENT
FOR THE
KAIPAPAʻU BRIDGE REPLACEMENT,
KAIPAPAʻU *AHUPUA'A*, KOʻOLAULOA DISTRICT, OʻAHU
(TMK: 5-4-14 and Adjacent Parcels 1, 2, 3, 4 & 21)

by
Tony Bush, B.Ed.
and
Hallett Hammatt, Ph.D.

Prepared for

B. M. Towill Corporation, O'ahu

Cultural Surveys Hawaii, Inc.

March 2003

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I. INTRODUCTION

A. Project Background

Cultural Surveys Hawaii Inc., has conducted a cultural practices assessment for the proposed Kaipapa'u Bridge replacement project in Kaipapa'u *Ahupua'a*, Ko'olauloa, Island of O'ahu (TMK 5-4-14 and adjoining parcels 1, 2, 3, 4 & 21) (Figures 1-2). The Kaipapa'u Bridge is 0.014 of a mile southeast of the intersection of Pipilani Place and Kamehameha Highway (State Route 83) (Thompson 1983).

The bridge improvements will include repairs and reconstruction to the *mauka* side of the bridge, while traffic still utilizes the *makai* side of the bridge. Upon completion of the *mauka* side, the *makai* side will be repaired and reconstructed, while traffic utilizes the *mauka* side.

State Site #'s 50-80-06-4795 (Buried Cultural Deposit with associated Human Burial), and -4796 (Human Burial) exist in close proximity to the current bridge replacement, with Site -4795 approximately 350 ft. south of the bridge, along Kamehameha Highway and extending *mauka*, and with Site -4796 approximately 120 ft. north of the bridge, immediately under the highway.

B. Project Area Description

The project area is the Kaipapau Bridge and its existing banks along the Kaipapau Stream, in Kaipapa'u *Ahupua'a*, Ko'olauloa, Island of O'ahu (TMK) (Figures 1- 2). The area surrounding the bridge and stream is fully urbanized. Residences exist along both sides of the stream, at all four corners of the bridge. The bridge foundations extend into natural soils on each side of the stream, underneath Kamehameha Highway. The stream in this area is completely channelized with concrete and stone walls, as a flood control measure. The stream bed is completely overgrown with tall grasses. The land owner is the State of Hawai'i.

The project area lies at the mouth of the Kaipapa'u Valley gulch. The geology of Kaipapa'u *Ahupua'a* consists of coastline with back shore sand deposits, and Kaipapa'u Stream. The soils of the project area are about evenly divided between Waialua stony silty clay, 3 to 8% slopes (WIB) soils on the west (*mauka* side) and Kawaihapai stony clay loam, 0-2% slopes (KlaA) soils on the east (*makai*) side (Foote et al. 1973). The Waialua series consists of moderately well-drained soils of alluvial fans with the Waialua stony silty clay having slightly difficult workability. The Kawaihapai soils are well-drained but workability is also slightly difficult because of stoniness (Foote et al. 1973). Rainfall within the project area is approximately 1500mm (60 in.) per year (Giambelluca 1986:73).

C. Scope of Work

The scope of work is modest and was designed to be appropriate to the perceived likelihood of cultural impact issues in the project area *per se*. The study does not fulfill OEQC guidelines for Cultural Impact Assessments, and will ask that if someone knows of some traditional Hawaiian cultural practices in the project area *per se* to please come forward. Additionally, the following Scope of Work was proposed for satisfying requirements as outlined by OEQC:

1. A brief field inspection by a recognized expert in cultural impact assessment to assess the likelihood of traditional Hawaiian cultural practices in the area of impact.

2. A brief review of the implications of any botanical study (or the botanists verbal synopsis if either is available) for the likelihood of traditional Hawaiian cultural practices in the area of impact.

3. Examination of historical documents, Land Commission Awards, historic maps, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal, and other resources or agricultural pursuits as may be indicated in the historic record.

4. A reviews of the existing archaeological information pertaining to the property as this may allow us to reconstruct traditional land use activities and identify and describe the cultural resources, practices, and beliefs associated with the parcel and identify present uses, if appropriate.

5. A modest attempt through letters and/or telephone calls (approximately 12), and face-to-face conversations with parties easily reachable in the area during the field check to assess the likelihood of traditional Hawaiian cultural practices in the area of impact.

6. A written report, not anticipated to exceed ten pages of text summarizing the methodology and results of Points 1 - 5 above and presenting our finding and conclusions based on work carried out.

D. Methods

Background research included a review of previous archaeological studies on file at the State Historic Preservation Division of the Department of Land and Natural Resources; a review of geology and cultural history documents at Hamilton Library of the University of Hawai'i, the Hawai'i State Archives, the Hawai'i Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum; and a study of historic maps at the Survey Office/Department of Accounting and General Services; and research on mid-1800's Land Commission Award documents (Waihona Aina).

Those who did respond and conducted interviews with CSH are listed on Table 2. Interviews were planned to include a face to face interview so as to photograph the interviewee's and tape the interview. In the case of this Cultural Practices Assessment, three individuals were sought for interviews. Interviews were conducted with Mr. Cy Bridges, Mr. Ben Nihipali, and Mr. Roland Logan. Interviews conducted for the Cultural

Practices Assessment were informal in nature, with one interview taking place during work (Mr. Logan), and two interviews being conducted over the phone (Mr. Nihipali and Mr. Bridges). Interview notes were then placed in full in the Interviews Section of this report.

Following insertion of interviews, a copy of the Cultural Practices Assessment was given to each interviewee for perusal and verification. Upon verification with interviewees, the report is complete and will be sent to SHPD for their review.

Additionally, pictures of Kaipapa`u Bridge in its present state were taken and are presented in Appendix A of this report.

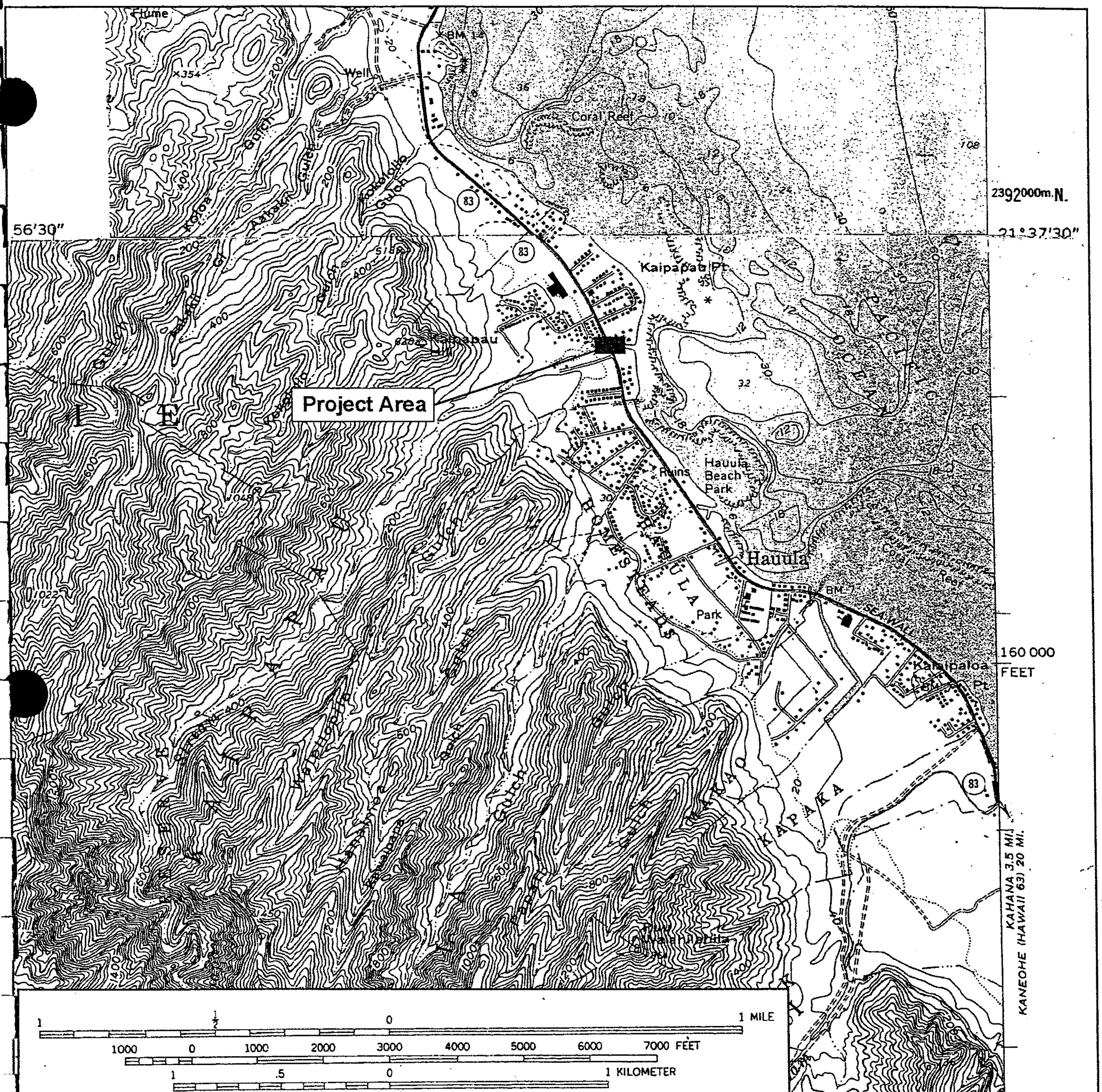

Figure 1 Portion of USGS Hau`ula Quadrangle Showing Project Location.

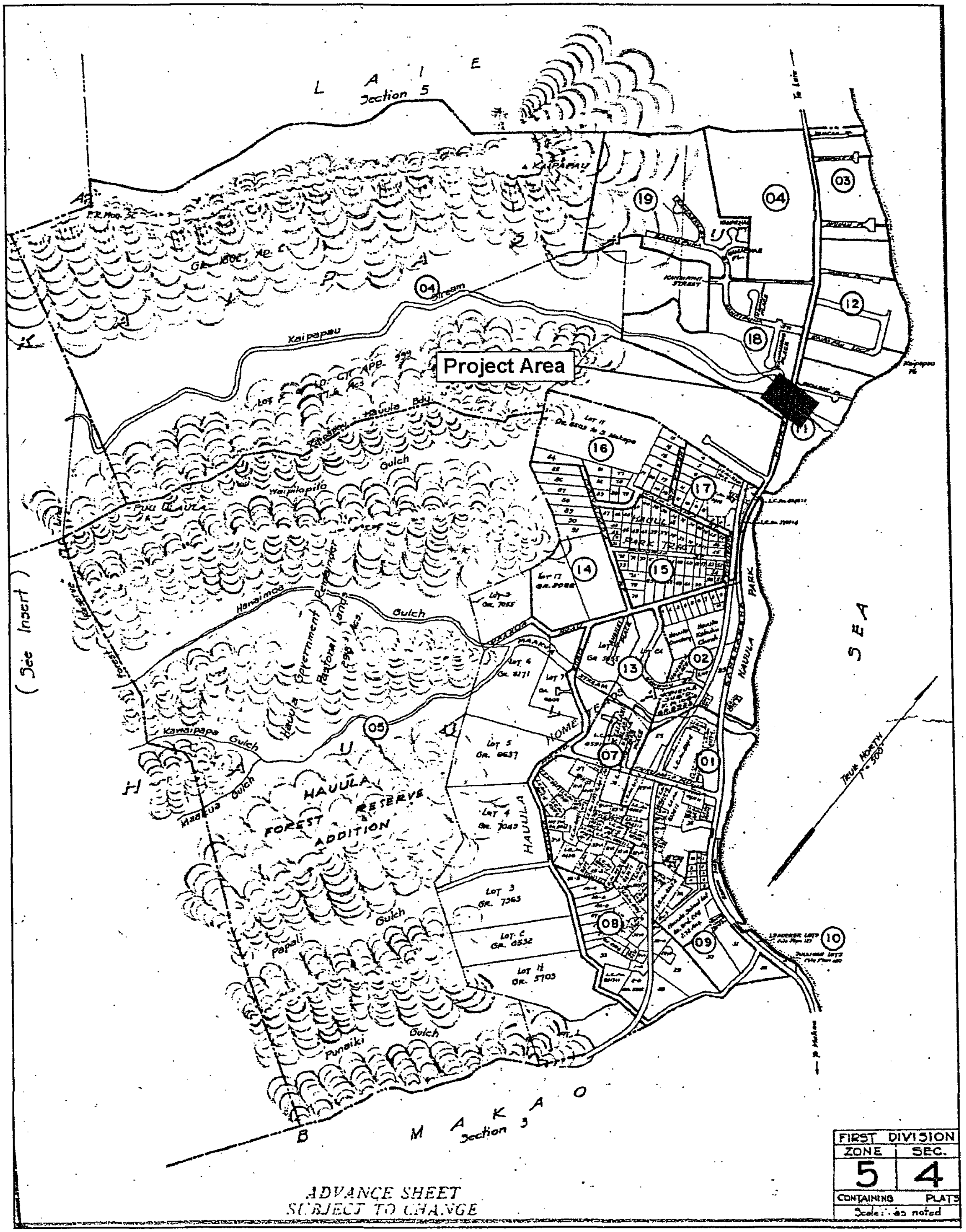

Figure 2 Tax Map Key 5-4, Showing Project Area.

II. KAIPAPA`U: CULTURAL AND HISTORICAL DOCUMENTATION

Cultural and historical documentation is provided here to provide a general background for Kaipapa`u, so that the specific project area parcel can be put in to a settlement pattern context for the reader. As Kaipapa`u *Ahupua`a* had a limited population (*e.g.* 6 total *kuleana* awards), additional information is listed here regarding cultural and historical documentation of Hau`ula *Ahupua`a*, neighboring Kaipapa`u to the south.

A. Mythological and Traditional Accounts

There are many legends associated with the *ahupua`a* of Kaipapa`u in the district of Ko`olauloa. Two specifically have to do with Kaipapa`u or Kaipapa`u Stream and are included here.

Several legends concerning this region of Ko`olauloa center on the theme of fishing lore. There is a legend about the *ulua* fish which takes place in Kaipapa`u (Westervelt version in Sterling and Summers 1978:160). The gods Kāne and Kanaloa threw dried fish into the sea where it came to life as the *ulua*. The fish then swam up the Kaipapa`u river (northwest of the present project area) to a place where the two gods were worshiped by a *kahuna* (Makuakaumana, see the story of *Makuakaumana*), a journey the *ulua* would continue to make whenever the river was accessible.

A legend concerning the *hilu* fish takes place in Hau`ula (Titcomb 1972:75-76). Two brothers, Kaululena and Ma`i`o, traveled to O`ahu in the form of the *hilu*, one going along the *kona* (leeward) side of the island and the other along the *ko`olau* (windward). Ma`i`o was caught and divided by fishermen in Hau`ula. Kaululena then assumed his human form, collected the pieces of his brother's body, and threw them into the ocean. He then went upland, dammed a stream with his body (Kaipapa`u Stream according to Titcomb, Ma`akua Stream according to Clark 1977:147), and then moved away, allowing the water to flood the land and flow into the sea where his brother Ma`i`o's body rejoined as the striped *hilu* fish. The only people of the valley to survive the flooding was an old man (the keeper of the two brother demi-gods, according to Titcomb) and his family who resided on a hill thereafter called Lanakila, meaning "to rise to a high place" or "victory" (Clark 1977:147).

These particular myths and traditional accounts were included for their representation of natural formations and phenomena as well as religious and historical occurrences specific to the *ahupua`a* of Hau`ula. The myths regarding landmarks account for place names and describe particular formations in the area. The legends regarding fishing lore tell of the origin, migration routes, and a method of catching certain fish in these areas and indicate the richness and importance of the local marine resources.

B. Mid-1800's (*Māhele*)

The *ahupua`a* of Kaipapa`u was seemingly not as densely populated during the time of the Māhele (mid-1800's) as neighboring Hau`ula. This is evidenced by the relatively few claims (6 total) within the *ahupua`a,* while numerous claims were made in the *ahupua`a* of Hau`ula (Waihona `Aina 2002).

Two LCA's existed along the banks of Kaipapa`u Stream, in the vicinity of the Kaipapa`u Bridge (LCA #s 8171 & 8167). LCA 8171 (R.P. 1319) awarded to Hoopalahe, was a large award of c. 22 acres. The parcel was located on the south side of the stream, with sections bordering the upper bank of the stream:

> Koekoe, sworn, says he knows the kalo land claimed by Hoopalahe in Hau`ula. There are two patches forming one piece, Bounded on the North by the stream...Witness knows the house lot claimed by Hoopalahe in Kaipapa`u, the stones are prepared for building a wall around it. It is bounded on the North by a stream...

LCA 8167 (R.P. 4768) awarded to Hikiau, encompasses the stream for approximately 700 ft from Kamehameha Highway extending *mauka* (west). It was a large award (8.75 ac.) and bounds against LCA 8171 on its' south side:

> Maiiahi, sworn, says he knows the kula land claimed by Hikiau in Kaipapa`u (a Government Land). There is but one piece which is cultivated in potatoes, melons, and it is bounded...South by the land of Hoopalahe...Witness knows the House Lot of Claimant. It is not enclosed. It is bounded on the Waialua side by a stream...

Additionally, other LCAs exist just south of LCA 8171, including LCA 8340 (R.P. 2050):ap. 1 & 2 (awarded to Kaiwinui and heir Makaiopulani), LCA 8416 (R.P. 8159) (awarded to Koaniani), and LCA 3700 (R.P. 1312):ap. 3 & 4 (awarded to Mokulama). Land use for these *kuleana* awards was similar (*i.e.* habitation and agricultural use within the same parcel) to that of LCA 8167 and 8171, discussed above.

<u>Settlement Pattern as shown by LCAs</u>

Kaipapa`u *Ahupua`a,* directly north of Hau`ula *Ahupua`a,* did have a small clustering of native Hawaiians living along the shore. More *mauka,* there were no individual *kuleana* parcels. In Hau`ula *Ahupua`a* there were three times as many LCA *kuleana* awards. Possibly, acreage of useable land, or resources on the land prevented the population from getting larger within Kaipapa`u. Two LCAs (8167 and 8171) bordered Kaipapa`u Stream on both sides from the shore to inland of the present day Kaipapa`u Bridge. Land use associated with the two LCA included habitation (*i.e.* houselot) and agriculture within relatively large parcels.

C. 1850-1900

The second half of the nineteenth century in Ko`olauloa was characterized by the influx of immigrant workers and the establishment of the Mormon presence in Lā`ie,

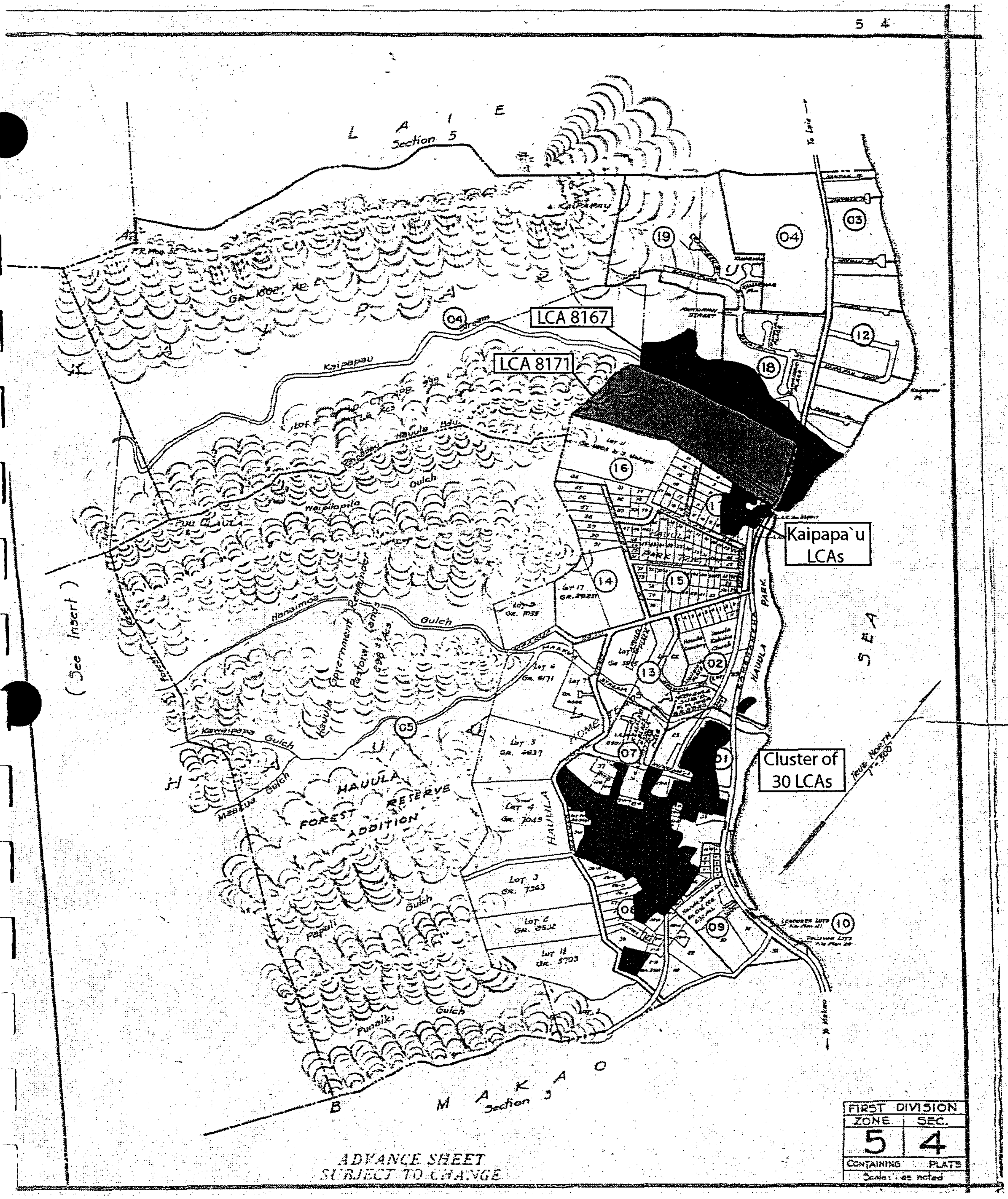

Figure 3 Portion of Tax Map Key 5-4, Showing Location of Kuleana Claims Near Kaipapa`u Bridge.

northwest of Hau`ula. Both communities were intensively involved in the agricultural activities of Ko`olauloa which would continue to be important elements of society in the years to come.

Immigrant Labor

Hawaiians made up the majority of the labor force on sugar plantations through the 1870s, but the combination of an expansion of this labor-intensive industry and a decrease in the Hawaiian population resulted in the need for a larger labor resource (Glick 1980:4-6). The importation of foreign labor from China and Japan, initiated by the Caucasian-owned plantations, fulfilled this need.

In 1852, the Chinese became the first group of imported contract laborers (Schmitt 1977:327). In rural windward Oahu, most Chinese worked on the sugar and rice plantations or had their own farms or stores. Chinese immigration reached its heaviest during the late 1800's, particularly the 1880's (Glick 1980:127). This increase in immigration occurred at the same time (mainly the 1880's, 1890's, and the early 1900's) that agricultural workers, dissatisfied with living conditions and the lack of job mobility, left the sugar plantations for other occupations (*ibid.*:39-41).

The Mormons

The Church of Jesus Christ of Latter Day Saints (Mormon Church) acquired its first holdings in Lā`ie in 1865, fifteen years after the initial ten missionaries arrived in the area (Sterling and Summers 1978:157). This acquisition, consisting of 6000 acres of plantation land in Lā`ie, served as the foundation for what would become a religious, agricultural, and financial stronghold. The first Hawaiian convert to the Mormon faith, baptized in 1869, was a man of royal lineage named J.H. Napela (Na-pela-kapu-o-Namahanaikaleleonalani), who was formerly active in the Congregational Church. The mission strengthened and in 1920 the Mormon temple was dedicated.

D. Early 1900's To Present

Major developments in Ko`olauloa during the 20th century include the growth of railroads in conjunction with the sugar industry, the construction of Kamehameha Highway, the construction of several hiking trails and a ranger cabin in the Ko`olau mountains, and the expansion of Mormon enterprises.

Railroad Companies

The three railroad companies in operation in Ko`olauloa during the early 1900's were the Kahuku Plantation Company, the Ko`olau Railway Company, and the Waiāhole Water Company. The operations of these companies improved the logistics of the sugar industry and provided a cultural and social connection for the various peoples inhabiting windward Oahu.

The creation of the Ko`olau Railway Company in 1905 by the Hawaiian Development Company, Ltd. (a conglomeration of businesses), under the impetus of James B. Castle, resulted not only in the improvement of agricultural transport but the unification of the windward community (Condè and Best 1974:308). The railway functioned in cooperation with the Ko`olau Agricultural Company, both of which were owned by the Zion Securities Corporation. This railway was envisioned as the connecting link between Kahuku (the Oahu Railway), Kāne`ohe, and Honolulu. However, its construction culminated with the initial section from Kahuku to Kahana, running past Kaipapa`u along the Kamehameha Highway alignment, which was completed by the end of 1907. In 1931, the Ko`olau Railway Company was purchased by the Kahuku Plantation Company which operated portions of the line until its dissolution in 1955 (Condè and Best 1974:298,300).

Although the Ko`olau Railway Company's line did not reach its ultimate destination of Honolulu, its presence on the windward side proved to be, if only for a limited time, a beneficial stimulus to the agricultural and ethnic community. As noted in a January 1908 issue of the *Pacific Commercial Advertiser* (Condè and Best 1974:308):

> From here [Kahuku] two trains run daily, connecting with the noon train from Honolulu and one reaching Kahuku in the late afternoon. Passengers and freight are carried as far as Kahuna and the traffic so far developed has been such as to encourage the promoters. The trip over the line is interesting and the fare is five cents a mile. Running rights over the line between Kahuku Mill and Lā`ie Plantation are given the Kahuku Plantation for the transportation of the Lā`ie cane crop...This, during the grinding season, makes the end of the line a busy one. The crop at Lā`ie this season is a good one too and the Mormon Settlement is a prosperous and busy one.

The main train station for the area was in Hau`ula, just south of the Kaipapa`u Bridge. The use of the railway by passengers is further related in an article in Thrum's 1911 *Hawaiian Annual* (128-133) which describes a leisurely train ride from Hale`iwa to Kahana, including a brief stop in Hau`ula, "a station of growing importance." Passengers on this excursion represented several nationalities including Chinese, "*haole*", and Hawaiian (who were the most numerous). In their study of rural Chinese of O`ahu, Char and Char (1988:114) indicate that the completion of the Kahana to Kahuku route, through improved transportation and produce exchange, strengthened ties between these district communities. The tracks ran *mauka* of the present project area (Figures 4 & 5).

<u>Kamehameha Highway</u>

The construction of Kamehameha Highway in 1932 (Figure 6) by the Department of Public Works, City and County of Honolulu reflected a major shift in transportation and resulted in the restructuring of the local community. By providing easier access to all parts of the island, the highway increased mobility and fostered urbanization. In the early to mid-1900's, the agricultural industry's switch from railway to truck transport rendered train hauling obsolete and the introduction of automobiles to Hawai`i marked an increase in individualized mobility, all of which furthered the development of an upgraded roadway.

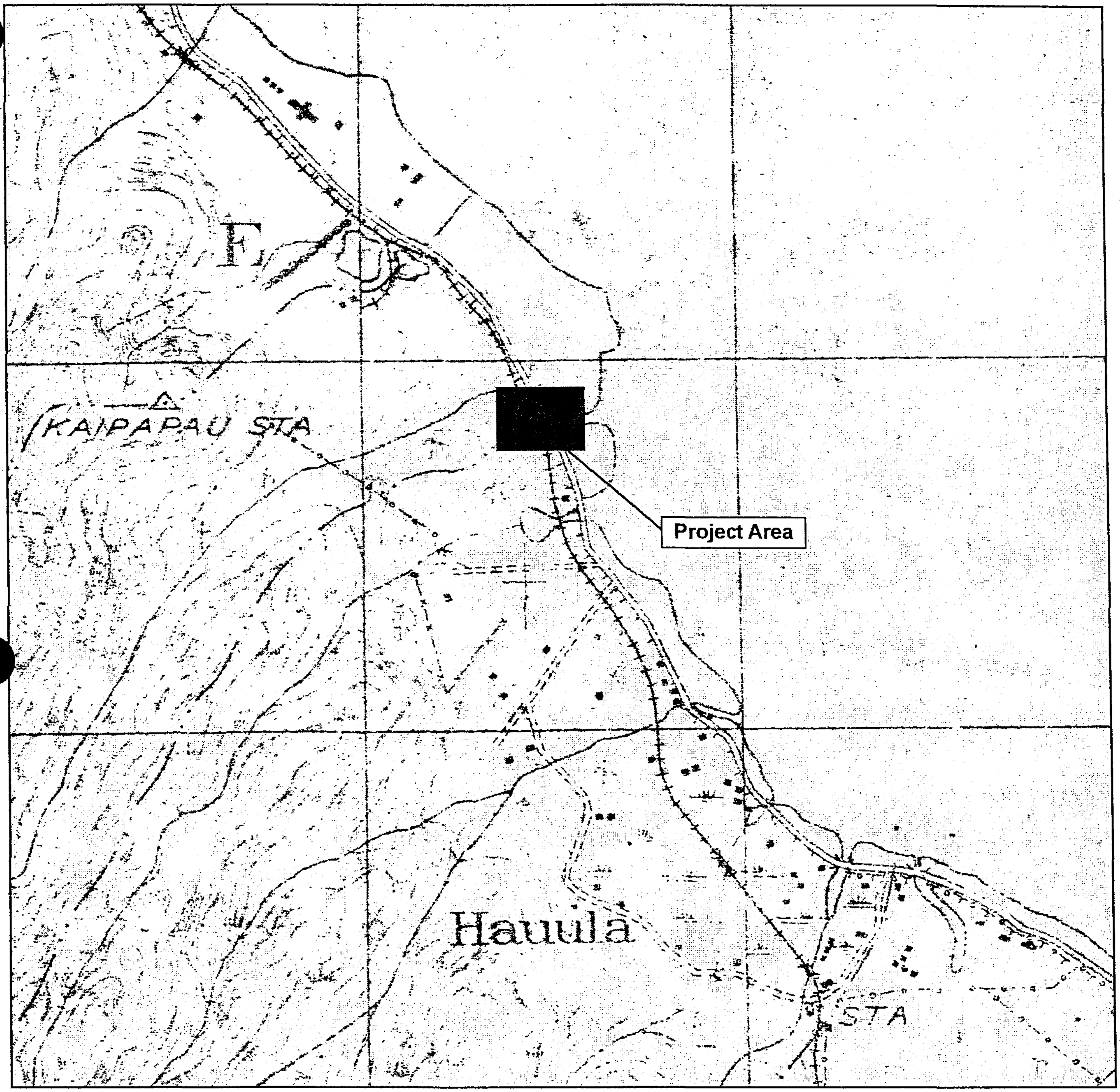

Figure 4 War Department Fire Control Map (1918) Showing Roads, Houses, and Fences in the Vicinity of the Project Area.

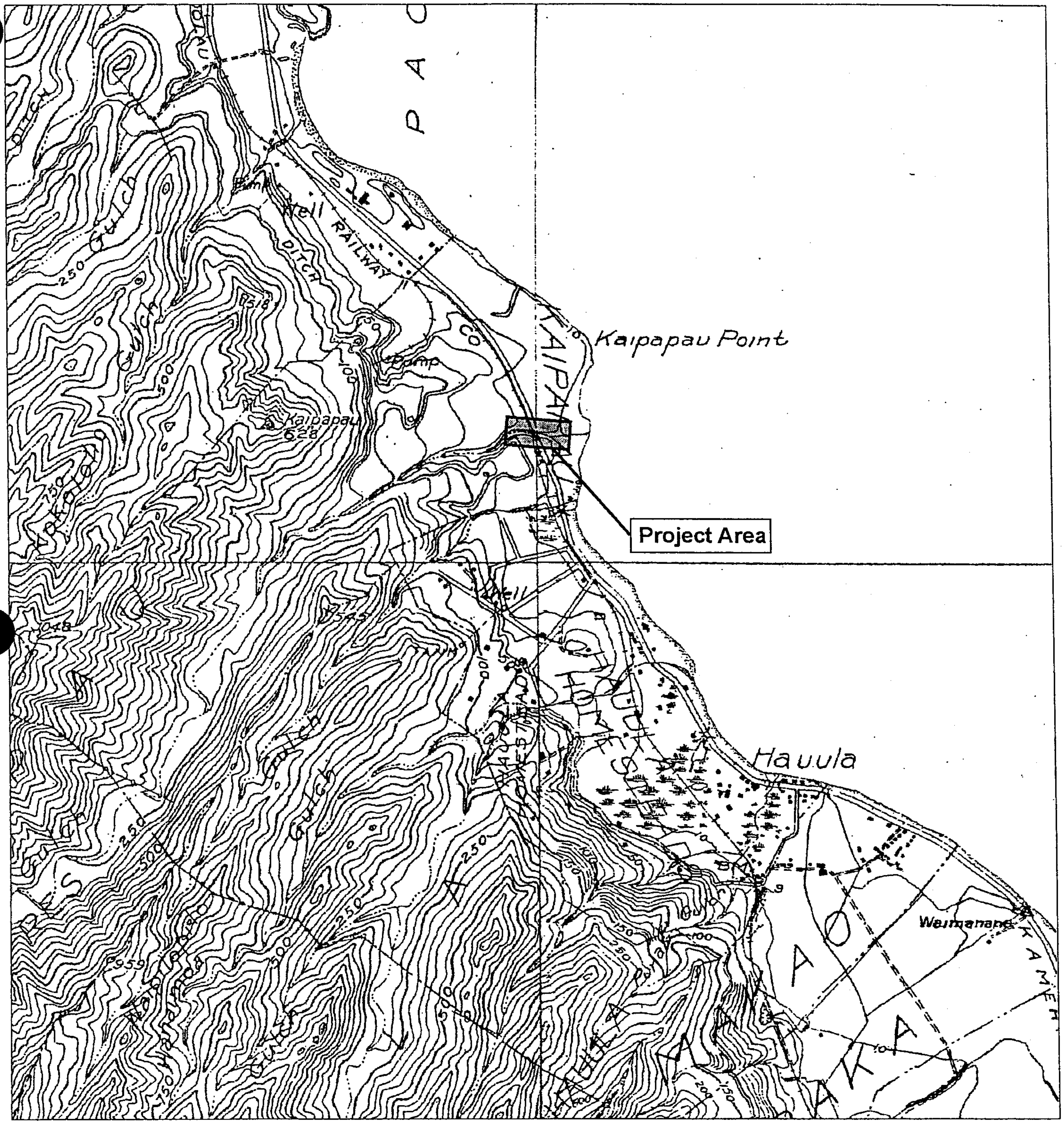

Figure 5 1924-1930 USGS Topographic 7.5 Minute Series Map, Kaipapau and Kahana Quads, Showing Infrastructure in the Vicinity of the Project Area.

Kaipapa`u Bridge

The Kaipapa`u Bridge was originally built in 1932 as part of the Kamehameha Highway project (Thompson 1983)(Figure 6). The bridge and the section of roadway immediately associated with it were constructed by contractor L. L. McCandless:

> The bridge is a two span reinforced concrete deck girder structure, 82' in total length, 28.4' wide, and 12' in height. It has a design load capacity of H-15. The abutments and parapets are constructed of reinforced concrete. There is a wooden railing and walkway on the right. The design integrity is not intact.
>
> The bridge is an important transportation link for Windward communities and it is associated with one of Honolulu's prominent builders (*Ibid.*).

At present, there appears to be some structural damage to the bridge (Figures 11 & 12). But sections of the bridge have been recently repainted, including the wooden pedestrian walk along the *mauka* side.

Modern Land Usage

The Kaipapa`u Bridge now exists within a fully urbanized setting, with residential units at all four corners of the bridge, and houses extending further up and down the stream on all sides (Figures 9-16). The former railroad bridge and tracks have long been dismantled. During an interview with Mr. Roland 'Ahi' Logan, he revealed that the railroad bridge and tracks were removed at the same time the shopping center to the north of the Kaipapa`u Stream was built; year not known.

E. Summary

Hau`ula has been an important place for traditional Hawaiians since early times. Several legends exists mentioning the locale of Kaipapa`u. By the Māhele, and most likely before it, while Hau`ula, directly to the south was densely populated (as evidenced by LCA data), the *ahupua`a* of Kaipapa`u only contained a few LCAs. Two of these (LCA 8167 & 8171) were located at the mouth of the stream. Both of these larger than average sized *kuleana* awards also had combined agricultural and habitational useages.

The coastline area of Kaipapa`u has long been a major transportation route. The sugar cane era (*ca.* early 1900's) brought the advent of the railroad to the area (Figures 4, 5, & 6). The railroad tracks and bridge were just *mauka* of the present-day Kaipapa`u Bridge. These tracks and the associated bridge over Kaipapa`u Stream were later dismantled; 'when the shopping center came in', according to Mr. Roland 'Ahi' Logan (Interviews section of this report). As automobiles became the main transportation choice in Hawai`i, the Kamehameha Highway was constructed (*ca.* 1932), much along the route of its' predecessor. Along with the Kamehameha Highway, Kaipapa`u Bridge was constructed (also 1932).

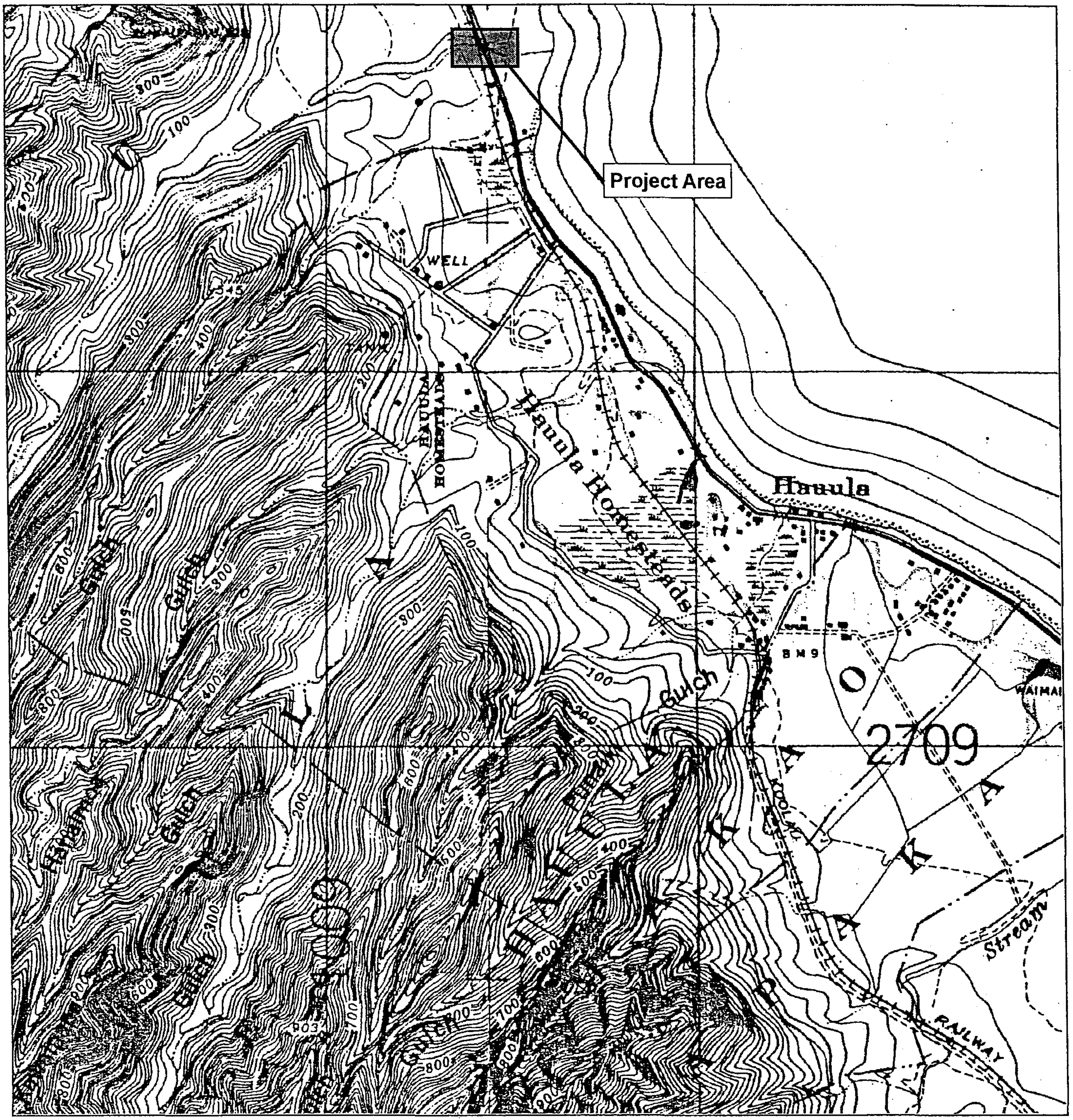

Figure 6 War Department 1943 Kahana Quad Map, Showing Infrastructure in the Vicinity of the Project Area.

III. PREVIOUS ARCHAEOLOGICAL RESEARCH

Archaeological research in Kaipapa`u *Ahupua`a* is very limited. Adjoining Kaipapa`u *Ahupua`a* to the south is Hau`ula *Ahupua`a*. As a multitude of archaeological research has been completed within Hau`ula, thought to be fairly similar to Kaipapa`u. Previous archaeological studies in Hau`ula *Ahupua`a* and vicinity are summarized in Table 1 and Figure 7 and are briefly summarized below. Sites previously designated in Hau`ula *Ahupua`a* and vicinity are located in Figure 8. As a generalization, previous archaeological studies have basically identified two types of sites: A) Cultural layers and burials near the coast, and B) Structural sites at the toe of the foot hills and in the valleys.

Table 1: Previous Archaeological Studies Hau`ula *Ahupua`a*

Source	Location	Study Type	Findings
McAllister 1933	Island-wide	Archaeological Reconnaissance	Identified 4 sites in vicinity: -286 Kaunihokahi Heiau, -287 Maunawila Heiau, -288 Inclosures & -289 Luaali`i Heiau
Hawaii Register of Historic Places Nomination Form for Site -1056	Kaipapau Valley	Historic Places Nomination Form	One platform in "Upper Kaipapau Stream" site
Steer & Morin 1978	Ma`akua Gulch	Site Survey	Identify 2 features, animal pens?
Connolly III 1980	Hau`ula Playground just W. of school	Archaeological Reconnaissance	No surface remains
Barrera 1981	*Makai* of Kam. Hwy. N. Kaipapau	Archaeological Reconnaissance	Extensive subsurface site, no site # given
Barrera 1984	Kaipapau Valley	Archaeological Reconnaissance	Viewed project area from ridge to south
Riford 1984	The 7-11 property in Hau`ula, situated *mauka* of Hau`ula Beach Park	Archaeological Reconnaissance	No significant finds

Smith 1987	Kaipapau Loop, Kaipapau Point	Archaeological Testing	No significant finds
McMahon 1988	Back of central Hau`ula Town	Field check	Identified Kaunihokahi Heiau
Walker & Rosendahl 1988a	Back of central Hau`ula Town	Archaeological Test Excavation	Report historic glass and branch coral in double enclosure Site -3394
Walker & Rosendahl 1988b	Kaipapau Exploratory Well, Kaipapau Valley	Archaeological Reconnaissance	Identified a wall and a ditch associated with Site -1056
Shun and Dies 1991	Mouth of Ma`akua Gulch	Archaeological Monitoring	Monitoring was to avoid impact to Site -3394. They identified Site-4227 further *mauka*
Landrum 1992	Mouth of Ma`akua Gulch	Archaeological Site Evaluation	Evaluates and recommends preservation measures for Sites -3394 and -4227
Bordner 1994	N. side Kaipapau Stream	Archaeological Assessment	Historic boundary walls and clearings noted. No sites designated.
Masterson *et al.* 1997	Kamehameha Hwy. Kapaka to Lā`ie Waterline	Archaeological Monitoring Report	Identifies cultural layer & burial Sites -4792 to -4798 in Hau`ula area
Wolforth 1997	Kukuna Road Central Hau`ula Town	Description of Sites	Briefly describes 5 sites: -5449, 5450, -5451, -5452 & -5453
Masterson *et al.* 1998	Hau`ula Beach Park	Archaeological Inventory Survey	Minimal findings
Elmore & Kennedy 1999	Hau`ula Elementary School	Burial Recovery	Burial (1) Site -5765 and probable cultural layer
Perzinski *et al.* 2000	Hau`ula Community Park	Archaeological Monitoring Plan	Plan for park
Bush & Hammatt 2001b	Hau`ula Baseyard, Kamehameha Hwy. & Hau`ula Homestead Road	Archaeological Monitoring Report	No significant Findings

Elmore & Kennedy 2001	Hau`ula Elementary School	Archaeological Monitoring Report	Burial (1) Site -5917
Bush & Hammatt 2001a	Hau`ula Beach Park Improvements	Archaeological Monitoring Report	Burial (1) Site -5801
Bush *et al* 2002	Dept. of Transportation Hau`ula Baseyard	Archaeological Monitoring Report	No evidence of any cultural material.

A. Cultural Layers and Burials Near the Coast

Coastal pre-contact sub-surface deposits have been shown to be common but spotty in distribution. Barrera (1981) encountered cultural deposits north of Kaipapau Point at a property immediately *makai* of the Hau`ula Kai Shopping Center. Although no surface sites were present, a coral concentration, historic and indigenous artifacts were recovered during testing which revealed an extensive cultural deposit. Eroding from the storm berm along the *makai* perimeter of the property a human burial was present. The subsurface feature and a human burial were assigned State Site #50-80-05-1430. At the point itself, Smith (1987) however, identified nothing of significance. An inventory survey at Hau`ula Beach Park (Masterson *et al.* 1998) found no cultural deposits but monitoring at the Beach Park (Bush & Hammatt 2002) encountered a single burial. The continuous transect of the archaeologically monitored Hau`ula Waterline project (Masterson *et al.* 1997) identified numerous sites (-4792 to -4798) but there were also long gaps. Work at Hau`ula Elementary School (Elmore and Kennedy, 1999 & 2001) encountered two burials. Other coastal studies may have encountered nothing either because of previous land disturbance (Riford 1984, Bush and Hammatt 2001) or because of an absence of subsurface testing. (Connolly III 1980). The report of numerous burials, *`imu*, pre- and post-contact cultural layers at a small project area on Kukuna Road in central Hau`ula Town (Wolforth 1997) underscores the possibility of significant finds in seaward areas.

B. Sites Near the Project Area

State Site #'s 50-80-06-4795 (Buried Cultural Deposit with associated Human Burial), and -4796 (Human Burial) exist in close proximity to the current bridge replacement. Site -4795 is approximately 350 ft. south of the bridge, immediately underneath the highway and extending *mauka.* Site -4796 is approximately 120 ft. north of the bridge, immediately under the highway.

These two state sites may be associated with nearby LCAs. These same LCAs border the proposed bridge improvements project area on both sides.

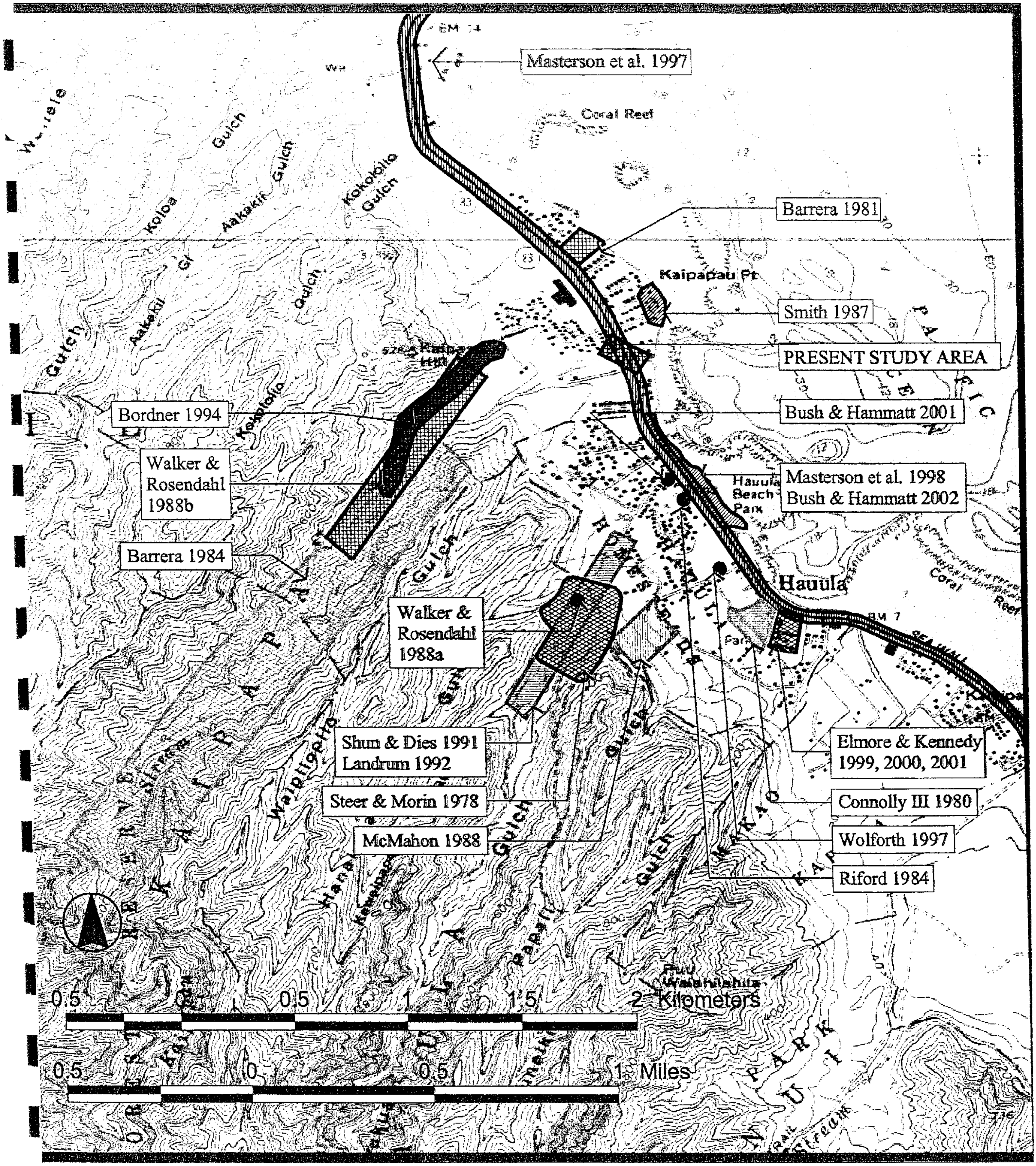

Figure 7 Portion of USGS Hau`ula Quad Map, Showing Location of Previous Archaeological Research in the Nearby Vicinity of the Kaipapa`u Bridge.

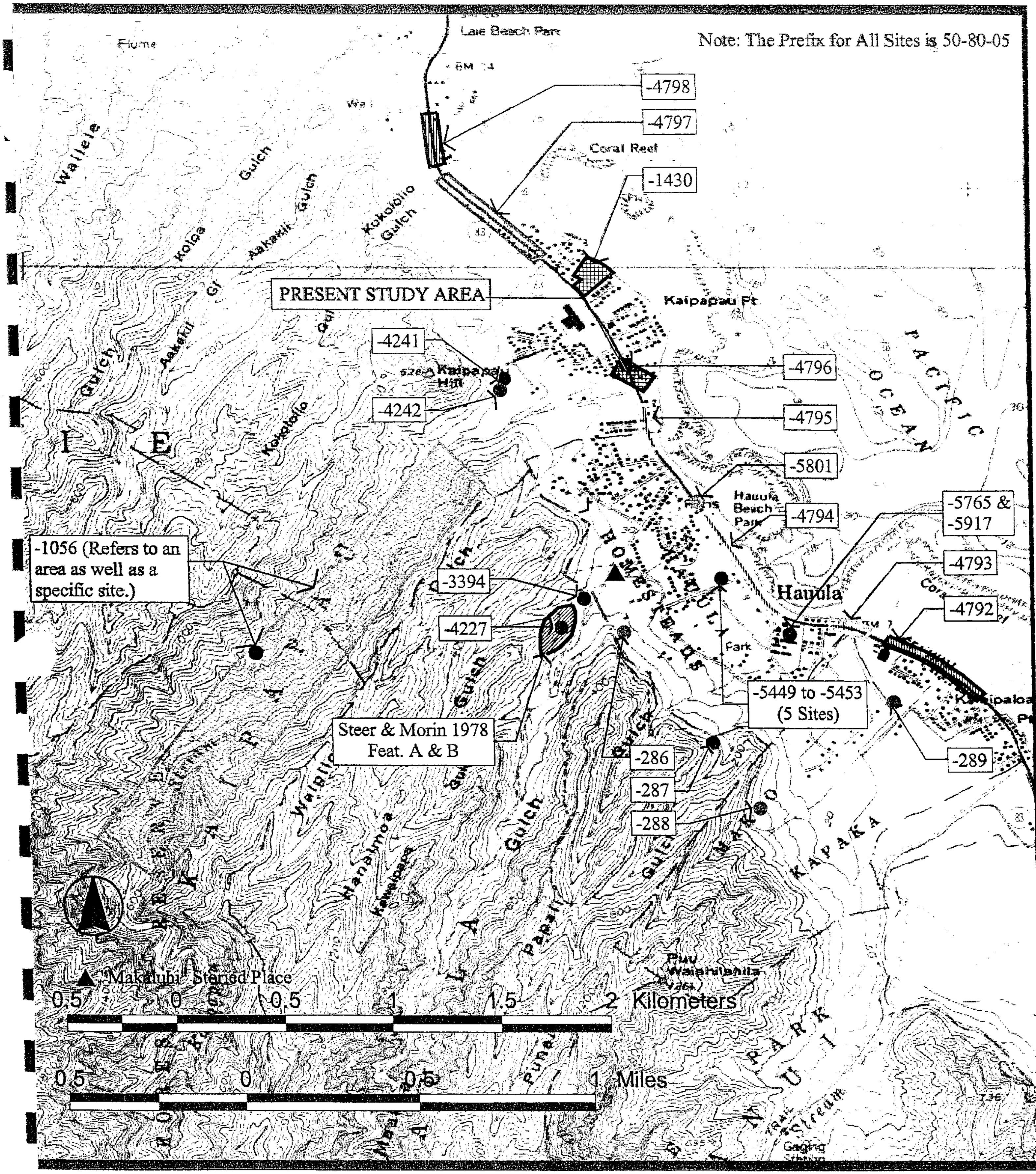

Figure 8 Portion of the USGS Hau`ula Quad Showing Archaeological Sites Near the Project Area

C. Background Summary and Predictive Model

The historic background and previous archaeological research sections indicate that the current project area located within the coastal zone of Kaipapa`u *ahupua`a,* has a high potential of containing extensive or significant sub-surface archaeological sites. Literary research in the form of legendary and traditional accounts, as well as LCA records indicated that the coastal zone of Kaipapa`u *ahupua`a*, especially near the Kaipapa`u Bridge, contained a density of habitation sites in the pre-historic period. Previous construction activities in the immediate vicinity of the current Kaipapa`u Bridge improvements have encountered human burials and cultural layers.

IV. INTERVIEWS

Interviews were conducted with knowledgeable individuals from the Hau`ula community to address issues such as specific knowledge of cultural practices and beliefs associated with the project area. Potential interviewee's were queried on duration and frequency of personal familiarity with the project area, referrals of other knowledgeable individuals, and public reaction to the project.

Interviewees included Mr. Cy Bridges, Mr. Benjamin Nihipali, and Mr. Ahi Logan. Table 2 lists all contacts, and includes the name and affiliation of the interviewee, whether or not contact was made, specific knowledge of the interviewees of the project area parcel, and additional comments regarding specific knowledge of the project area.

Table 2 Community Interviews

NAME	AFFILIATION	CONTACTED	KNOWLEDGE OF PROJECT AREA	COMMENTS
Cy Bridges	Polynesian Cultural Center-Hawaiian Cultural Advisor	Y	Y	Contact original owners (Izeki/Iseke)
Benjamin Nihipali	Hau`ula Resident	Y	Y	Tsunami details.
Roland 'Ahi' Logan	Cultural Monitor, Hau`ula Resident	Y	Y	Previous land usage; Tsunami, Railroad Bridge; Fishing practices.

Key: Y=Yes N=No
A=Attempted S=Some knowledge of Project Area
D=Declined to comment
U=Unable to comment (*i.e.*, no phone or forwarding address, phone number unknown)

Mr. Cy Bridges

Cultural Surveys Hawai`i has interviewed Mr. Cy Bridges several times regarding a variety of different projects within the Lā`ie to Punalu`u area. As a long-time resident, a *kumu hula*, and the Cultural Advisor for the Polynesian Cultural Center, he is very familiar with the area, traditional customs that may be associated with certain areas, and knows many of the areas resident families.

When questioned about the Kaipapa`u Bridge, Mr. Bridges revealed what he knows about the bridge and Kaipapa`u *ahupua`a* in general. He remembers the former land owners, the 'Iseke (Izeki?)' family. They owned a large portion of land, including the land that holds the Kaipapa`u Bridge and much of the stream itself. The family was so prominent for the area that Mr. Iseke was informally called 'Mr. Kaipapa`u'.

Up *mauka* from the Kaipapa`u Bridge was the Iseke's piggery. The piggery was wiped out during the Tsunami of 1946. But people who now live in that area can still notice a remnant smell of the piggery. Mr. Bridges recommended contacting the grand-daughter of the Iseke family, Laura Stoke?, but does not know how to contact her. Mr. Bridges does not recall the date that the Kaipapa`u Bridge was completed. Mr. Bridges did not mention any specific cultural concerns regarding proposed improvements to Kaipapa`u Bridge.

Mr. Benjamin Nihipali

Mr. Nihipali is a longtime resident of the area. After the interview, the only relevant information regarding the Kaipapa`u Bridge was about the *tsunami* (of 1946?). He remembers the water coming up the stream adjacent to his house, as well as Kaipapa`u Stream, surging up the valley, coming up on their lawn fronting their house, but not enough to inundate the house. Mr. Nihipali did not mention any specific cultural concerns regarding the proposed improvements to Kaipapa`u Bridge.

Mr. Roland 'Ahi' Logan

Mr. Logan is a longtime resident of the Hau`ula-to-Lā`ie area. He is 73 years old. He has shared a wealth of knowledge about the area with CSH regarding other projects in the area. Although unable to conduct an interview that could be recorded, Mr. Logan went over some important details he remembers over the years, regarding Kaipapa`u Bridge.

Firstly, Mr. Logan translated the name Kaipapa`u for me. Kai literally means '*water*'. Papa means reef, and Papa`u translates to '*exposed reef*. Together, Mr. Logan translated the name Kaipapa`u as '*when the waters recede, the reef is exposed.*'

Mr. Logan recalls that old-timers utilized the stream for fresh water fishing, for both *o`opu* and *`opae*. Of all the streams in the area, Mr. Logan recalls that the Kaipapa`u Stream has always had the strongest and most steady flow.

He recalls when the entire land *mauka* of the bridge was still in sugar cane. The sugar cane companies maintained the Kaipapa`u Stream very well. The sugar cane railroad had a bridge over the Kaipapa`u Stream, just *mauka* of the Kamehameha

Highway bridge. When the City and County took over the land, the stream was never again maintained as well as when the sugar cane company maintained it. At present, the stream is completely clogged with tall grasses and weeds.

On April 1, 1946, Mr. Logan recalls witnessing the *tsunami*, perched up in a *kamani* tree right along the shore line, somewhere between Hau`ula and Lā`ie. He was 15 years old at the time and felt the tree would be a good vantage point to watch the wave come ashore. The first wave came up gradually, and seeped its way inland. The waters then receded to what Mr. Logan calls '1 mile out'. The entire reef was exposed. People who lived around ran out and grabbed as much fish as they could. The second wave came ashore, this time going 200 ft. or more up all streams, and coming up past the highway. Large boulders were pushed back and forth across the land. The receding waters took two houses back into the ocean with it. The third and final large wave took more houses out. Surprisingly, according to Mr. Logan, only one person died during the ordeal, in the immediate community.

Through the *tsunami* of 1946, both the highway and railroad bridges survived with minimal damage. When the nearby shopping center, immediately northwest of the Kaipapa`u Bridge, was constructed (year not known), the old railroad bridge, which had already been abandoned for quite some time, was torn down. In 1988, heavy rains that drenched the entire island of O`ahu, and caused further damage to the highway bridge, mainly from flood debris flowing underneath and striking it.

Additionally, Mr. Logan informed me that there is a *heiau* further up Kaipapa`u Stream. He is unclear of the location but claims that one of the social workers at the nearby Queen Lili`uokalani Children's Center knows the location of the *heiau*.

V. CULTURAL PRACTICES

Because the bridge exists in an urbanized zone of Hau`ula/Kaipapa`u, ongoing cultural practices were not expected to be prominent. Although the urban nature of the project are argues against ongoing cultural practices, it still seems appropriate to briefly summarize potential cultural impacts, as they may be discerned from the historic records and the previous research in the vicinity.

A. Archaeological Sites

There are no historic properties (other than Kaipapa`u Bridge) within the project area. A survey of the parcel included a complete surface survey in, around, and under the bridge, and historic background research on the bridge.

Background data indicates six mid-1800's awarded *kuleana* parcels were awarded in Kaipapa`u, two of which formerly existed in the project area at the bridge location. Additionally, two historic sites exist in close proximity to the bridge, State Site # 50-80-06-4795 (approximately 350 ft. south) and State Site # 50-80-06-4796 (approximately 120 ft. north).

B. Burial Sites

Coastal Hau`ula is well-known for having been the site of many traditional and early historic Hawaiian burials. The vast majority of these burial finds have been within or seaward of Kamehameha Highway. Jaucas sand deposits likely to contain burials are likely to exist within or near the present project area. Burials have been encountered immediately to the north and south of the bridge (*i.e.* Sites -4795 & -4796).

C. Fishing

Fishing for freshwater resources (*e.g. `opae, o`opu*) occurred in the stream previous to its urbanization, based on informant information. Undoubtedly, fishing still occurs for similar species though on a much reduced basis. Fishing will not be stopped due to any proposed bridge improvements.

D. Gathering

The project area has been heavily modified and the only plants present are several palm trees, landscaping foliage near houses, and tall grasses within the stream. At the point of urbanization that the bridge and its surrounding land is at now, no gathering practices are apparent within the project area.

E. Hunting

Hunting, specifically pig hunting, does not take place within the project area, although hunting does occur further up many of the surrounding valleys.

F. Sacred Sites

The Hau`ula area was well-known for its many important *heiau* (including Kaunihokahi, Kaipapa`u, and Lua`ali`i). None of these is understood as having been in or near the present project area.

F. Trails and Access

No trails or accessways would be inhibited in any way by the re-construction and repairs to the Kaipapa`u Bridge. The 'modern trail' (the Kamehameha Highway) will be pushed into one-lane access during the construction to the bridge.

G. *Wahi Pana* (storied places)

No storied places (*wahi pana*) are known within the present project area other than the qualities adhering to Kaipapa`u in general.

H. Conclusions

This good-faith attempt to evaluate the potential cultural impacts of the proposed project area on the basis of historical data, archaeological data, and informant information, concludes that there may be a possibility of encountering cultural layers and/or human burials during excavation associated with repairs to the Kaipapa`u Bridge. The entire project area was extensively modified in the past during construction of the former railroad bridge, the Kaipapa`u Bridge, and Kamehameha Highway, and the urbanization of the surrounding land. No traditional cultural practices have been identified within the project area that would be stopped by proposed bridge improvements.

A total of 3 persons were contacted for their input on and knowledge about the project parcel. Contacts included Mr. Ben Nihipali, Mr. Roland 'Ahi' Logan, and Mr. Cy Bridges.

There were no major concerns regarding the repairs to the Kaipapa`u Bridge voiced by area residents. Interviewee's were happy to share their experiences with and about the bridge, and seem to have no opposition to repairs being initiated on an important travelway of the immediate area.

In compliance with standard SHPD/DLNR requirements, CSH recommends archaeological monitoring of the planned bridge improvements due to known significant subsurface sites, both north and south of Kaipapa`u Bridge.

VI. REFERENCES

Armstrong, R. Warwick, Editor and Project Director
1973 *Atlas of Hawaii,* Department of Geography, University of Hawaii, University of Hawaii Press, Honolulu, HI.

Barrera, Jr., William M.
1981 *Hauula, Oahu: Archaeological Survey,* Chiniago, Honolulu, HI.

Beckwith, Martha W.
1970 *Hawaiian Mythology,* Archaeological Research Center Hawaii, Inc., University of Hawaii Press, Honolulu, HI.

Board of Water Supply, City and County of Honolulu
1991 *Environmental Assessment for a 16-Inch Transmission Main From Hauula to Kaipapau, Island of Oahu, Hawaii,* Prepared by Wilson Okamoto & Associates, Inc., Honolulu, HI.

Bordner, Richard M.
1992 Archaeological Inventory Survey for Kaipapau Exploratory Well, Hau`ula '180' Reservoir and Access Road, Appendex B in *Final Environmental Impact Statement, Hauula 180 Reservoir and Booster Station (TMK 5-4-4:4 and TMK 5-4-19:54),* Ahupua`a of Kaipapa`u, Prepared for Board of Water Supply, City and County of Honolulu, by Engineering Design Group, Inc., Honolulu, HI.

Bryan, E. H. Jr.
1933 "A Nature Trail at Hauula", *The Mid-Pacific Magazine,* Volume 46:pp. 133 - 138.

Bryan, E. H. Jr.
1991 <u>Bryan's Sectional Map Book</u>, Honolulu, HI.

Bush, Tony, and Hallett H. Hammatt
2001a *Archaeological Monitoring Report for the Hau`ula Beach Park Improvements, Ko`olauloa, O`ahu (TMK: 5-4-02:22),* Cultural Surveys Hawaii, Inc., Kailua HI.

Bush, Tony, and Hallett H. Hammatt
2001b *Archaeological Monitoring Report for the Hau`ula Base Yard Improvements, Project No. HWY-0-03-98, 54-310 Hau`ula Homestead Road, Hau`ula, Ko`olauloa, O`ahu (TMK: 5-4-02:12),* Cultural Surveys Hawaii, Inc. Kailua HI.

Char, Tin-Yuke and Wai Jane Char
1988 *Chinese Historic Sites and Pioneer Families of Rural Oahu*, Hawaii Chinese History Center, Inc., Honolulu, HI.

Chun, James H.
1983 *The Early Chinese in Punaluu*, Yin Sit Sha, ???.

Clark, John R. K.
1977 *The Beaches of O`ahu.* A Kolowalu Book, University Press of Hawaii, Honolulu, HI.

Condè, Jesse C. and Gerald M. Best
1974 Sugar Trains, Narrow Gauge Rails of Hawaii, Glenwood Publishers, Felton, CA.

Connolly, Robert D.
1980 *Archaeological Reconnaissance Survey at the Hauula Playground Site*, Archaeological Resource Associates, Honolulu, HI.

Elbert, Samuel H.
1959 *Selections from Fornander's Hawaiian Antiquities and Folklore*, University of Hawaii Press, Honolulu, HI.

Elmore, Michelle and Joseph Kennedy
1999 *A Report Concerning the Inadvertent Discovery of Human Remains at Hau`ula Elementary School TMK: (1) 5-4-06:4 in Hau`ula Ahupua`a, Ko`olauloa District, Island of O`ahu* Archaeological Consultants of the Pacific, Inc., Hale`iwa, HI.

Foote, Donald E., E.L. Hill, S. Nakamura and F. Stephens
1972 *Soil Survey of the Islands of Kaua`i, Oahu, Maui, Molokai and Lanai, State of Hawaii*, U.S. Dept. of Agriculture, U.S. Government Printing Office, Washington, D.C.

Free, David
1994 *Vignettes of Old Hawaii*, Crossroads Press, Inc., Honolulu, HI.

Glick, Clarence E.
1980 *Sojourners and Settlers: Chinese Migrants in Hawaii.* Hawaii Chinese History Center and The University Press of Hawaii, Honolulu, HI.

Handy, E.S. Craighill and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*, Bishop Museum Bulletin 233, Honolulu, HI.

Haraguchi, Karol
1987 *Rice in Hawaii: A Guide to Historical Resources,* Hanalei, HI.

Judd, Charles S.
1933 *Report on Kaipapau Cabin*, Territory of Hawaii, HI.

Kaua`i Historical Society
1991 *The Kauai Papers*, A Kauai Historical Society Publication, Lihu`e, Kaua`i, HI.

Kennedy, Joseph
1992 *An Archaeological Data Recovery Report for the Proposed Kokololio Beach Park Located at TMK 5-5-1:54 La`iemalo`o Ahupua`a, Koolauloa District, Island of Oahu*, Hale`iwa, Rev. Dec. 1992.

Kugle, Scott
1991 "Lanakila-Hau`ula Congregational Church," *Historic Hawaii*, March issue, 14-15, Honolulu, HI.

Masterson, Ian, Tom Devereux and Hallett H. Hammatt
1998 *Archaeological Inventory Survey and Subsurface Testing Report for the Proposed Expansion of Hau`ula Beach Park, Ko`olauloa, O`ahu (TMK5-4-02:22)* Draft, Cultural Surveys Hawaii, Kailua, HI.

Masterson, Ian, Melody Heidel, Leilani Pyle, David Shideler and Hallett H. Hammatt
1997 *An Archaeological Monitoring Report for the Kapaka to Lā`ie Waterline*, Prepared for the Board of Water Supply, Cultural Surveys Hawaii, Kailua, HI.

McAllister, J.G.
1933 *Archaeology of O`ahu*, Bishop Museum, Bulletin 104, Honolulu, HI.

Perzinski, David, David W. Shideler and Hallett H. Hammatt
2001 *Archaeological Monitoring Plan for Hau`ula Community Park, Hau`ula Ahupua`a, Ko`olauloa District, O`ahu (TMK: 5-4-01, 5-4-08 and 5-4-09; Various Parcels)*, Cultural Surveys Hawaii, Kailua, HI.

Pukui, Mary Kawena
1983 *Olelo No`eau: Hawaiian Proverbs and Poetical Sayings*, Bishop Museum Special Publication No.71, Bishop Museum Press, Honolulu, HI.

Pukui, Mary K., Samuel H. Elbert and Esther Mookini
1974 *Place Names of Hawaii*, University of Hawaii Press, Honolulu, HI.

Rice, William Hyde
1923 "Hawaiian Legends," *Bernice P. Bishop Museum Bulletin 3*, Honolulu, HI.

Riford, Mary F.
1984 *Archaeological Reconnaisance of Shell Oil Company Property,* Bishop Museum, Honolulu, HI.

Schmitt, Robert C.
1977 *Historical Statistics of Hawaii*, The University of Hawaii Press, Honolulu, HI.

State of Hawaii, Department of Land and Natural Resources (DLNR)
1991 *Na Ala Hele, Hawai`i Trail & Access System Program Plan*, DLNR, Honolulu, HI.

State of Hawaii, DLNR and The National Park Service
1990 Draft, *Hawaii Stream Assessment, Hawaii's Streams and their Instream and Riparian Resources*, Honolulu, HI.

Steer, D. and J. Morin
1978 *Ma`akua Gulch, Hau`ula, Oahu, Site Survey*, University of Hawaii Hamilton Library, Honolulu, HI.

Sterling, Elspeth P. and Catherine C. Summers
1978 *Sites of O`ahu*, Dept. of Anthropology, B.P. Bishop Museum, Honolulu, HI.

Thompson, Bethany
1983 Historic Bridge Inventory: Island of Oahu, prepared for the State of Hawaii, Department of Transportation, Highways Division, Honolulu, HI.

Thrum, Thomas G.
1911 "For Kahuku and Beyond. Narrative of a Day's Outing by Train," *Hawaiian Annual for 1911*, pp. 128-133.

Titcomb, Margaret
1972 *Native Use of Fish in Hawaii,* University of Hawaii Press, Honolulu, HI.

Wagner, Warren L., Derral R. Herbst and S.H. Sohmer
1990 *Manual of the Flowering Plants of Hawai`i,* 2 vols., University of Hawaii Press, Honolulu, HI.

Walker, Alan T. and Paul Rosendahl
1988 *Archaeological Reconnaisance Survey of the Proposed Kaipapau Exploratory Well Site and Access Road Project Area. Report 418-111088(K).* Paul H. Rosendahl, PhD, Inc. ms for Belt Collins & Assoc., Hilo, HI.

Ziegler, Alan
1996 Hau`ula to Laie Technical Report.

APPENDIX A: PHOTOGRAPHS

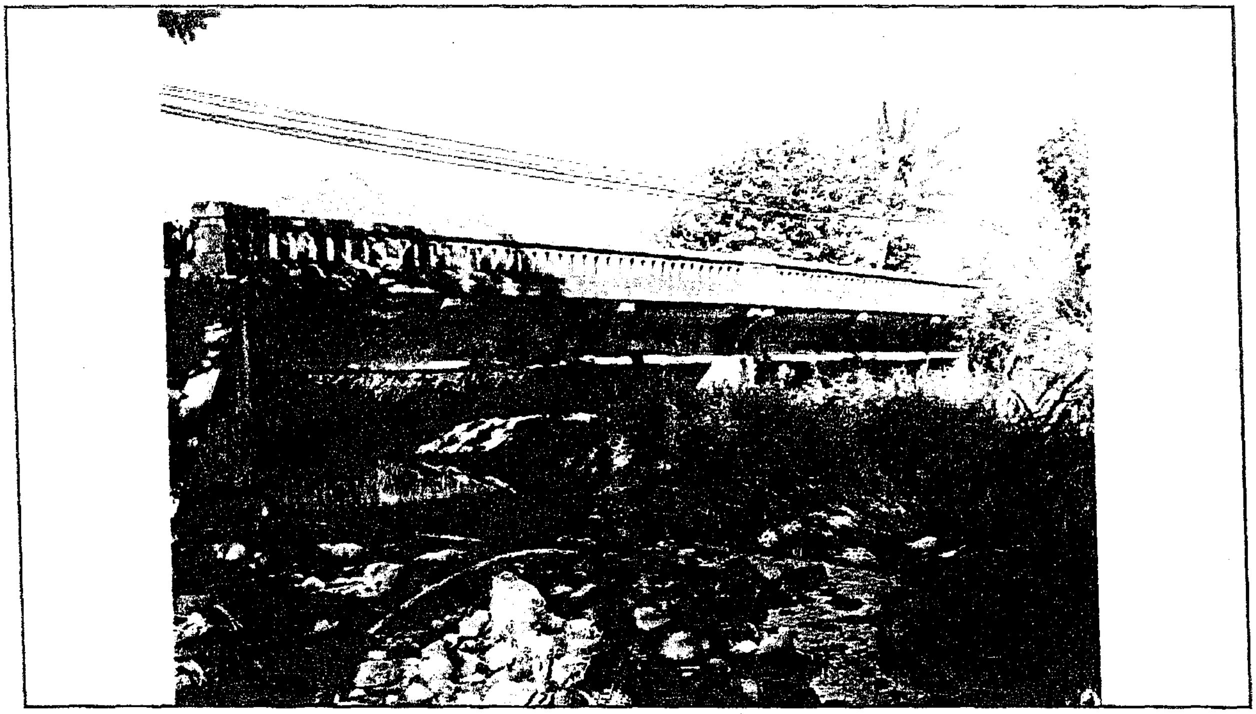

Figure 9 Photo of Kaipapa`u Bridge and Stream, taken to west.

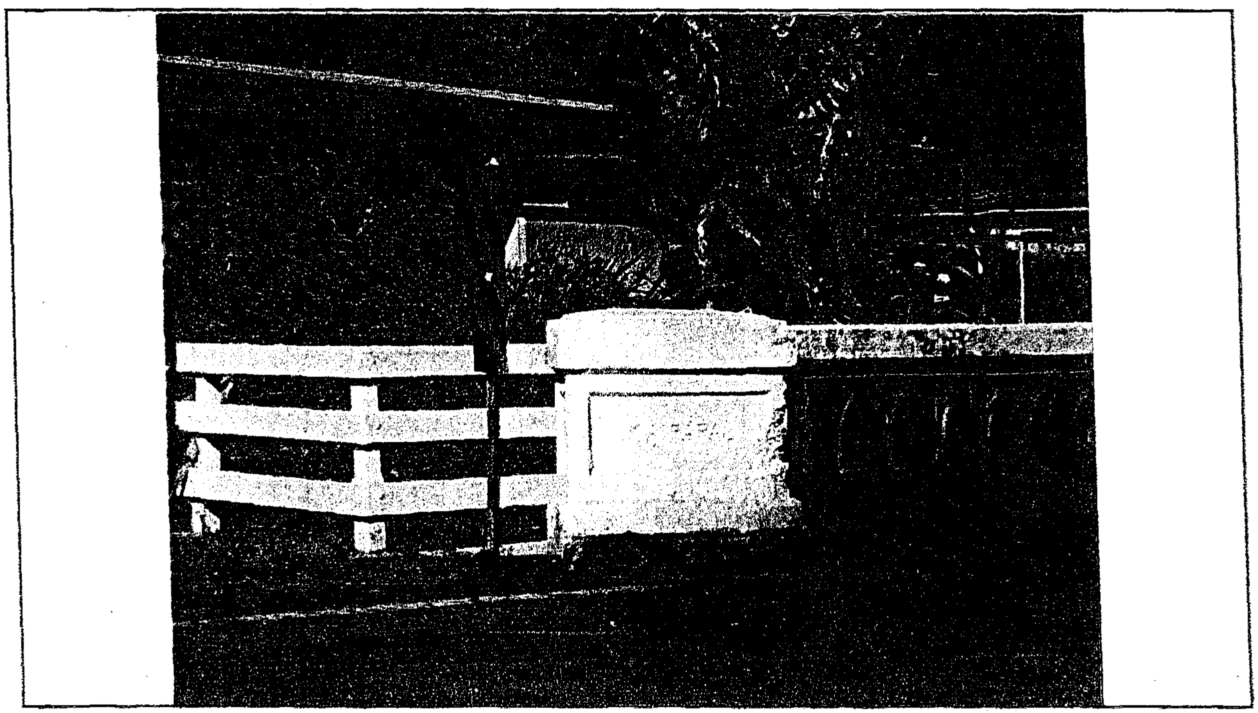

Figure 10 Photo of Kaipapa`u Bridge, showing 'KAIPAPAU' emblem on mauka south bridge corner, taken to west/northwest.

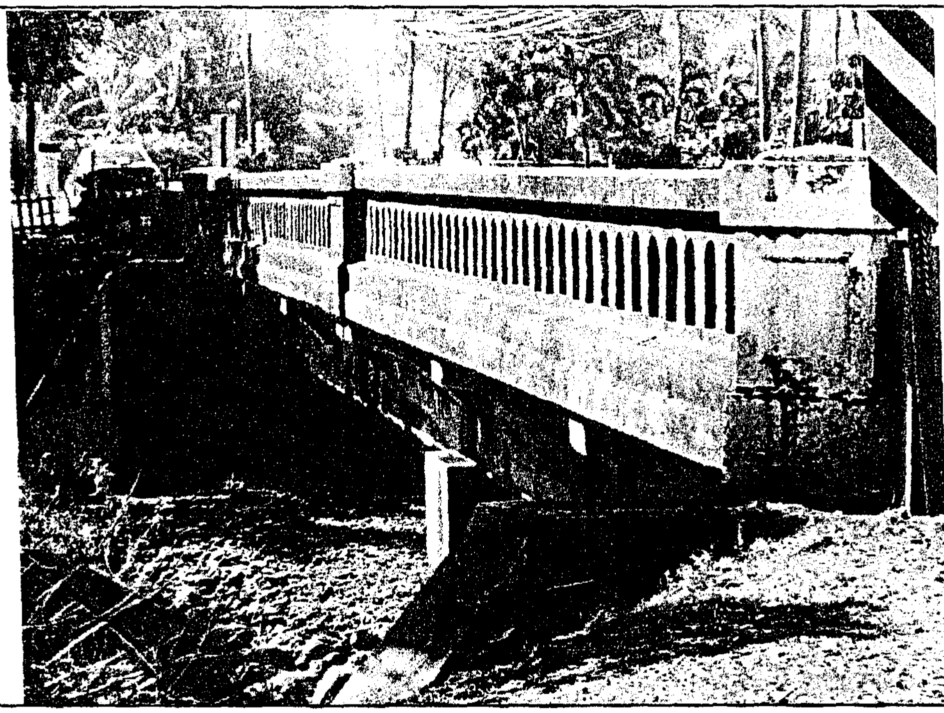

Figure 11 Photo of Kaipapa`u Bridge, Makai Side, Taken to South.

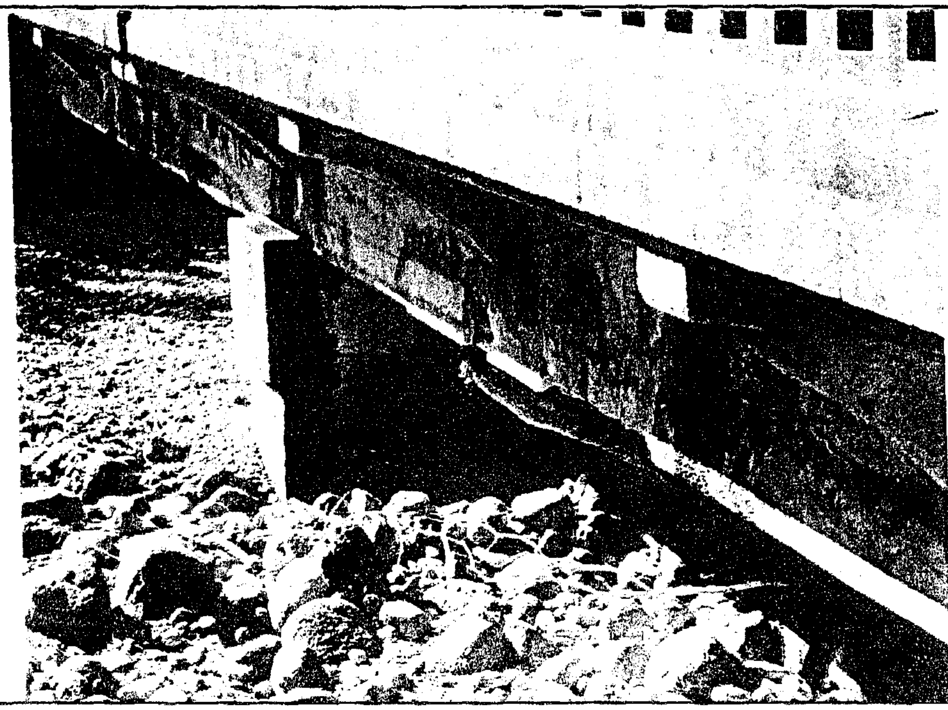

Figure 12 Photo of Kaipapa`u Bridge, Makai Side, Showing Structural Damage, Taken to South/Southwest.

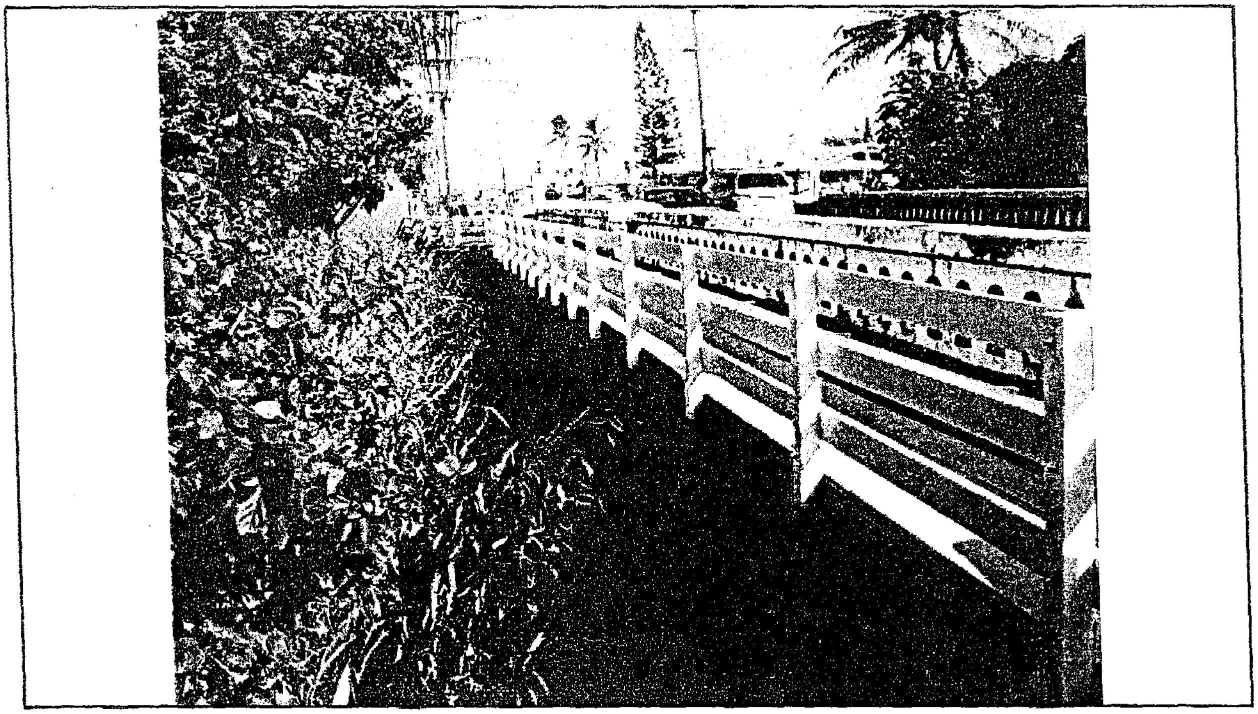

Figure 13 Photo of Kaipapa`u Bridge and Accompanying Pedestrian Walkway, Taken to North.

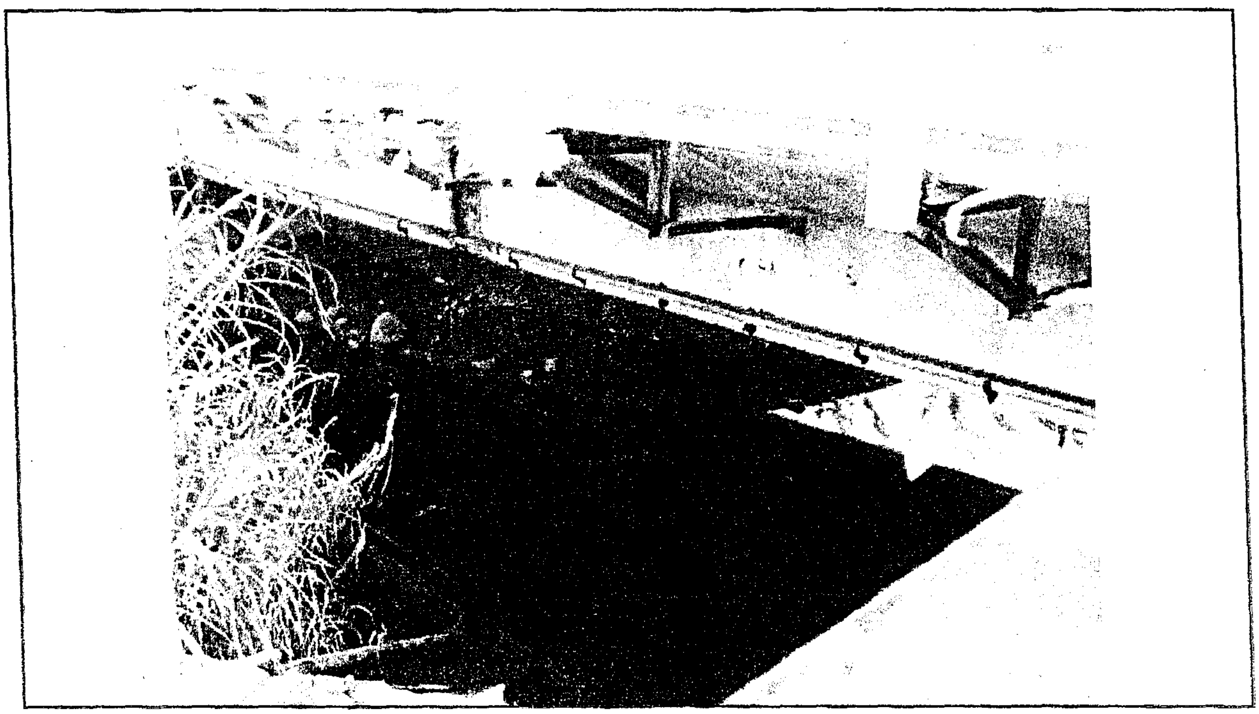

Figure 14 Photo of Kaipapa`u Bridge, Mauka Side, Showing Kaipapa`u Stream and Underneath the Pedestrian Walkway.

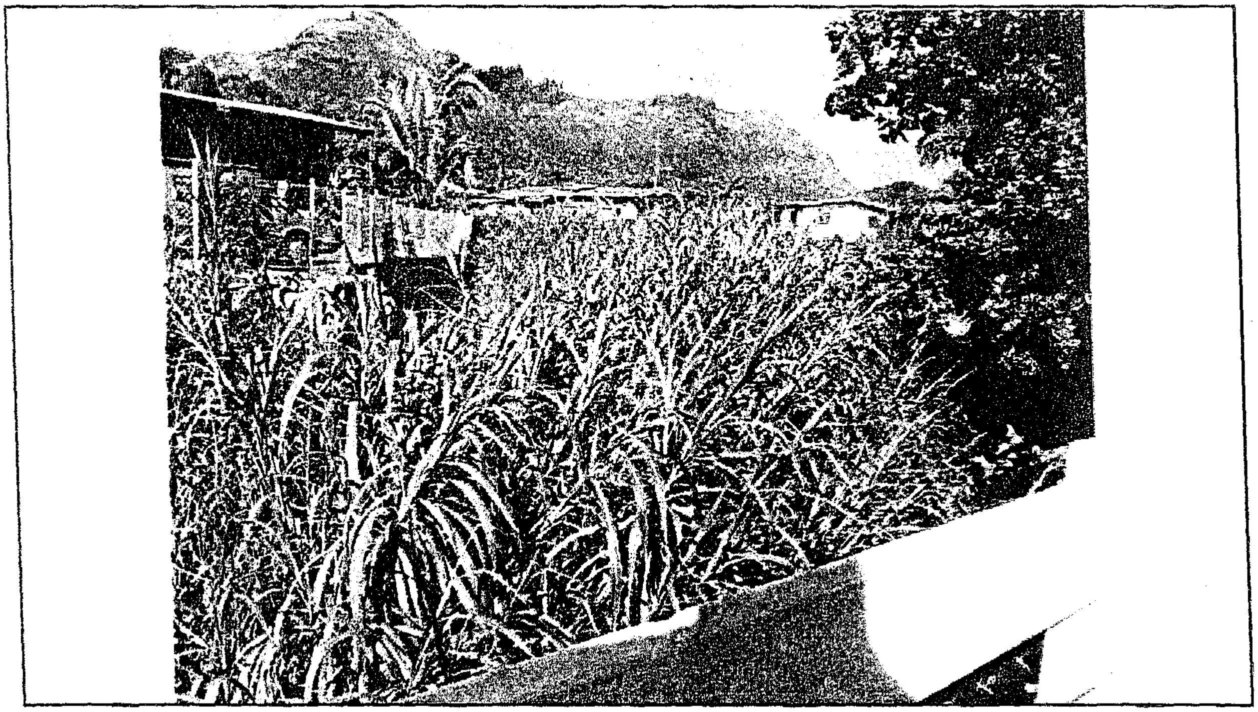

Figure 15 Photo of Kaipapa`u Stream Mauka of the Kaipapa`u Bridge, Currently Completely Overgrown With Tall Grasses.

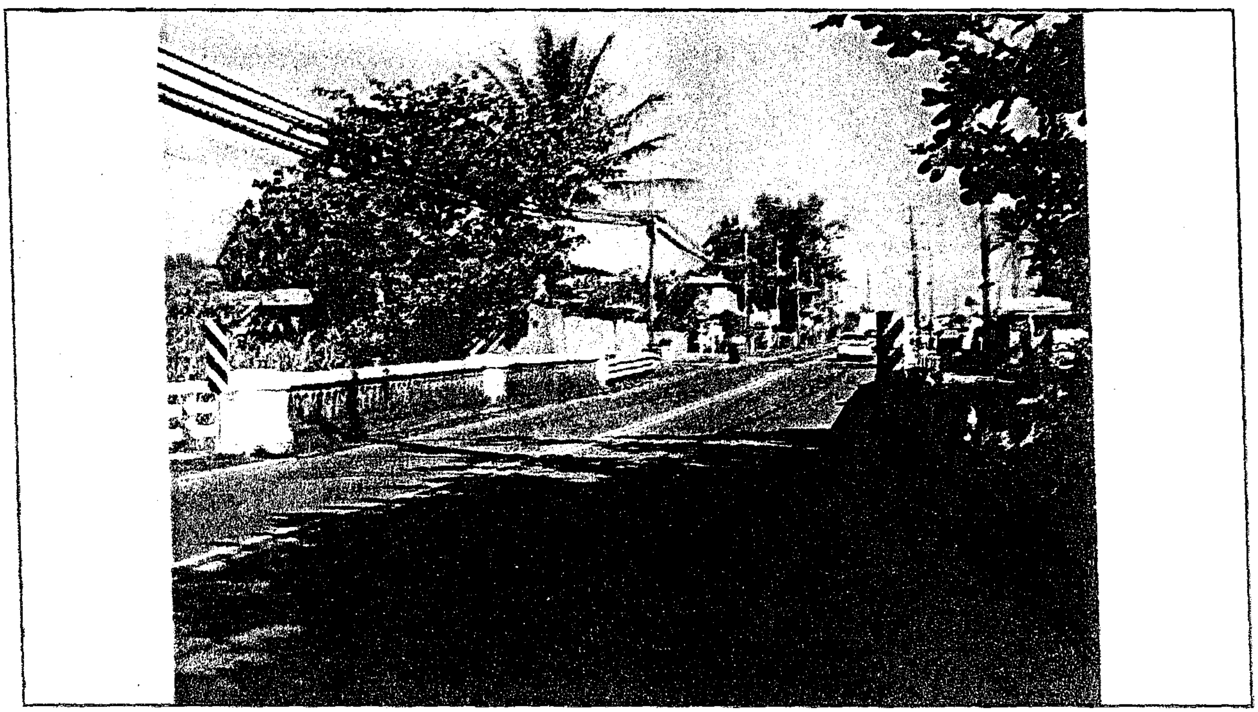

Figure 16 Photo of Kaipapa`u Bridge and Kamehameha Highway, Taken to North.

Appendix B

Botanical Resources Study,
Kaipapa‘u Stream Bridge Replacement Project,
Ko‘olauloa District, O‘ahu

Winona Char and Associates

CHAR & ASSOCIATES
Botanical / Environmental Consultants
4471 Puu Panini Ave.
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24 April 2004

Mr. Chester Koga
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

**SUBJECT KAIPAPA'U STREAM BRIDGE REPLACEMENT
BOTANICAL RESOURCES ASSESSMENT STUDY**

Dear Mr. Koga:

Field studies to assess the botanical resources on the Kaipapa'u Stream Bridge project site were made on 03 March 2004 by Char & Associates. The primary objectives of the survey were to:
1) provide a general description of the vegetation on the project site;
2) search for threatened and endangered species as well as species of concern; and
3) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

The Kaipapa'u Stream Bridge is located along Kamehameha Highway in Hau'ula, O'ahu, near the Hau'ula Kai Shopping Center. Along this portion of the highway, it passes through a residential area; Pipilani Street is located on the north end of the study area. The existing bridge as well as the approach area, 200 feet on either side of the bridge, was surveyed. The bridge replacement work will be within the existing right-of-way.

Description of the Vegetation

The plant names used in this report follow Wagner *et al*. (1990) and Wagner and Herbst (1999). The few recent name changes are those reported in the Hawaii Biological Survey series (Evenhuis and Eldredge, eds., 1999-2002).

Within the approach area along the right-of-way, there are asphalt-covered walkways and grassy mowed lawns. The grassy strips along the highway are primarily Bermuda grass or manienie (*Cynodon dactylon*) with smaller mats of wiregrass (*Eleusine indica*) and Hilo grass (*Paspalum conjugatum*). Landscaping on the residential lots fronting the highway consists of an assortment of ornamental species which include spider lily (*Pancratium maritimum*), beach naupaka or naupaka kahakai (*Scaevola sericea*), false kamani (*Terminalia catappa*), croton (*Codiaeum variegatum*), *Hibiscus* cultivars, coconut trees

(Cocos nucifera), etc. A few weedy patches are found here and there. These support mostly annual, herbaceous species such as white-flowered beggar's tick (Bidens alba), sensitive plant or puahilahila (Mimosa pudica), nutgrass (Cyperus rotundus), field bindweed (Ipomoea alba), Chinese violet (Asystasia gangetica), Guinea grass (Panicum maximum), broad-leaved plantain (Plantago major), and false mallow (Malvastrum coromandelianum).

On the bridge itself, there are a few clumps of swollen fingergrass (Chloris barbata) and white-flowered beggar's tick. These plants occur in cracks with pockets of soil between the edge of the pavement and the concrete railings.

Upstream (mauka side) of the bridge, the stream banks are lined with dense elephant or Napier grass (Pennisetum purpureum), 7 to 8 feet tall. On the top banks, it is largely Guinea grass with a few scattered koa haole (Leucaena leucocephala) shrubs. On the downstream (makai) side of the bridge, the vegetation is open with patches of elephant grass and a few tall false kamani trees border the house lots. The stream bottom is rocky in this area.

Discussion and Recommendations

The Kaipapa'u Stream Bridge is located in a residential area along Kamehameha Highway in Hau'ula Town. Landscape plantings and mowed grassy lawns border either side of the bridge. A few weedy patches occur within the right-of-way.

Only two native plant species, beach naupaka and popolo (Solanum americanum), were observed within the project site. Both are indigenous species, that is, they are native to the Hawaiian Islands and elsewhere. Beach naupaka is a common coastal species and is also often used in landscaping, often for hedges. Popolo is often found in disturbed habitats; it prefers open, sunny areas. None of the plants found during the field studies is a threatened and endangered species or a species of concern (U.S. Fish and Wildlife Service 1999a, 1999b; Wagner et al. 1999). This is not surprising given the location of the project site.

The proposed replacement of the bridge at Kaipapa'u Stream in Hau'ula is not expected to have a significant negative impact on the botanical resources. However, areas cleared of vegetation should be grassed over as soon as possible to prevent excessive dust and runoff of sediment into the stream. Bermuda grass or Hilo grass, which are already used on nearby lawns and on the grassy strip along the highway, should be used.

Please do not hesitate to contact me should you have any questions regarding the report.

Sincerely,

Winona P. Char

Winona P. Char

References

Evenhuis, N.L. and L.G. Eldredge, editors. 1999-2002. Records of the Hawaii Biological Survey. Bishop Museum Occasional Papers Nos. 58-70.

U.S. Fish and Wildlife Service. 1999a. U.S. Fish and Wildlife Service species list, plants. March 23, 1999. Pacific Islands Office, Honolulu, HI.

U.S. Fish and Wildlife Service. 1999b. Endangered and threatened wildlife and plants. 50 CFR 17.11 and 17.12. December 31, 1999.

Wagner, W.L., M.M. Bruegmann, D.R. Herbst, and J. Q.C. Lau. 1999. Hawaiian vascular plants at risk: 1999. Bishop Museum Occasional Papers 60.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and Bishop Museum Press, Honolulu. Bishop Museum Special Publication 83.

Wagner, W.L. and D.R. Herbst. 1999. Supplement to the Manual of the flowering plants of Hawai'i, pp. 1855-1918. In: Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. Revised edition. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu.

Appendix C

Noise Impact Assessment

D.L. Adams and Associates

D. L. ADAMS ASSOCIATES, LTD.
Consultants in Acoustics and Performing Arts Technologies

Project No. 03-45

ENVIRONMENTAL NOISE REPORT
KAIPAPAU STREAM BRIDGE REPLACEMENT
KAMEHAMEHA HIGHWAY
O'AHU, HAWAII

April 2004

Prepared for
R. M. Towill Corporation
Honolulu, Hawaii

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CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 The Kaipapau Stream Bridge Replacement project is proposed to replace the existing bridge structure with a new bridge. The new bridge will keep the same number of vehicle lanes but will be much wider to accommodate pedestrian and bicycle traffic paths on both sides of the new bridge.

1.2 At a distance of 15 feet from the edge-of-pavement of Kamehameha Highway, the existing noise levels range from approximately 70 dBA during the daytime hours to approximately 60 dBA during the night. Any residence within 60 feet of the Kamehameha Highway currently exceeds the FHWA guidelines of 67 dBA (maximum) at the exterior of a residence. The dominant noise source is vehicular traffic on Kamehameha Highway, but other noises include wind, birds, and an occasional small aircraft flyover.

1.3 The dominant noise sources during project construction will probably be earth moving equipment, such as bulldozers and diesel powered trucks. Typical road construction equipment, such as asphalt paving machines will also be required. Pile driving equipment may be required for the new bridge foundation. Noise from construction activities will occur on the project site. Noise from construction activities should be short term and must comply with State Department of Health noise regulations.

1.4 Traffic on Kamehameha Highway is not expected to increase or decrease as a result of the bridge replacement project. Therefore, traffic noise as a result of the project is also not expected to increase or decrease after the work is complete. Future traffic projections show an approximate 16% increase the number of vehicles in the year 2026. This results in less than 1 dB increase in traffic noise over the existing noise levels. A 1 dB increase is not perceptible to most listeners.

2.0 PROJECT DESCRIPTION

The Kaipapau Stream Bridge is part of the Kamehameha Highway near the north shores of O'ahu, Hawaii. The project site is near single and multi-family residential housing. A map of the area is shown in Figure 1.

The bridge will be completed in stages, so that half of the bridge will be open at all times. When one side of the bridge is complete, the remaining side will be demolished and rebuilt. Although vehicular traffic on the Kamehameha Highway will be modified during construction of the new bridge, an alternate detour route is not planned. During construction only one lane of traffic may be open, so traffic on both sides of the bridge will have to stop and obey traffic signals. The speed of traffic through the construction site will be slower than the existing traffic speeds.

Typical road construction equipment will be on-site throughout the construction of the new bridge. The proposed bridge will be wider than the existing bridge and will carry a total of 2 vehicular traffic lanes and 2 bicycle/pedestrian paths.

3.0 NOISE STANDARDS

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented in Appendix A.

3.1 State of Hawaii, Department of Health, Community Noise Control

The State of Hawaii Department of Health Community Noise Control Statute [Reference 1] defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to stationary noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc., and equipment related to agricultural, construction, and industrial activities. These levels are enforced by the State Department of Health (DOH) for any location at or beyond the property line and shall not be exceeded for more than 10% of the time during any 20-minute period. The specified noise limits which apply are a function of the zoning and time of day as shown in Figure 2. With respect to mixed zoning districts, the statute specifies that the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level.

3.2 U.S. Environmental Protection Agency (EPA)

The U.S. EPA has identified a range of yearly day-night equivalent sound levels, L_{dn}, sufficient to protect public health and welfare from the effects of environmental noise [Reference 2]. The EPA has established a goal to reduce exterior environmental noise to an L_{dn} not exceeding 65 dBA and a future goal to further reduce exterior environmental noise to an L_{dn} not exceeding 55 dBA. Additionally, the EPA states that these goals are not intended as regulations as it has no authority to regulate noise levels, but rather they are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise.

3.3 U.S. Federal Highway Administration (FHWA)

The FHWA defines four land use categories and assigns corresponding maximum hourly equivalent sound levels, L_{eq}, for traffic noise exposure [Reference 3], which are listed in Table 1. For example, Category B, defined as picnic and recreation areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals, has a corresponding maximum exterior L_{eq} of 67dBA and a maximum interior L_{eq} of 52 dBA. These limits are viewed as design goals, and all projects meeting these limits are deemed in conformance with FHWA noise standards.

3.4 Hawaii Department of Transportation (HDOT)

The HDOT has adopted FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy [Reference 4]. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15 dB.

4.0 EXISTING ACOUSTICAL ENVIRONMENT

Ambient noise level measurements were conducted from March 31, 2004 to April 5, 2004, at the locations shown on Figure 1 (see "1" and "2"). Both measurement locations are approximately 15 feet from the edge-of-pavement of Kamehameha Highway, which is the approximate distance of the nearest house to the highway. The purpose of these measurements was to assess the existing acoustical environment at the proposed project site. These measurements were taken with a Larson-Davis Laboratories, Model 820, Type-1 Sound Level Meter (S/N 0774) together with a Larson-Davis, Model 2560 Type-1 Microphone (S/N 2231).

The results are graphically presented in Figure 3, which shows the measured equivalent sound levels, L_{eq}, in A-weighted decibels (dBA). The graph shows that the sound levels range from approximately 70 dBA during the daytime hours to approximately 60 dBA during the night. Therefore, the existing daytime noise levels at 15 feet from the edge of the highway exceed the FHWA guidelines of 67 dBA (maximum) at the exterior of the nearest residences. Our noise predictions indicate that any residence within 60 feet of the edge of Kamehameha Highway currently exceeds the FHWA guidelines.

Weather conditions can adversely affect noise measurements. Periods of rain and high winds are typical factors that can skew the noise measurement results. Printouts of the weather conditions reported from the Kaneohe Bay MCBH are available upon request, or can be downloaded from the www.wunderground.com website. The Kaneohe Bay MCBH is approximately 20 miles south east of the project site. The weather conditions show periods of light rain in the morning hours of April 2nd and April 3rd, and in the early morning hours of April 4th. These periods of potential rain are shown in "gray" on the graph in Figure 3.

Presently, traffic is the dominant noise source at the measurement locations. Other noise sources include wind, birds, and small aircrafts.

5.0 POTENTIAL NOISE IMPACT DUE TO THE PROJECT AND NOISE MITIGATION

5.1 Project Construction Noise

Development of project areas will involve excavation, grading, and construction of the new bridge. The various construction phases of the project may generate significant amounts of noise. The surrounding residential properties may be impacted by the project construction noise due to their proximity. The actual noise levels produced during construction will be a function of the methods employed during each stage of the construction process. Typical ranges of construction equipment noise are shown in Figure 4.

In cases where construction noise exceeds, or is expected to exceed the State's "maximum permissible" property line noise levels [Reference 1], a permit must be obtained from the DOH to allow the operation of vehicles, cranes, construction equipment, power tools, etc., which emit noise levels in excess of the "maximum permissible" levels. In the State of Hawaii, noise permits are required for construction projects. Specific permit restrictions for construction activities are:

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels . . . before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday."

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels . . . before 9:00 a.m. and after 6:00 p.m. on Saturday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

The use of pile drivers, hoe rams, jack hammers 25 lbs. or larger, high pressure sprayers, and chain saws may be restricted to 9:00 a.m. to 5:30 p.m., Monday through Friday.

5.2 Project Generated Traffic Noise

Measured traffic noise levels along with traffic volume and vehicle mix counts obtained during the measurements were used to calibrate the FHWA's Traffic Noise Prediction Model [Reference 5]. Although the traffic patterns and flow will be altered during construction, the traffic counts will not change after construction of the bridge is complete. Therefore, the predicted noise levels after the project is complete are the same as the existing noise levels prior to construction.

The predicted traffic counts for the year 2026 show an approximate 16% increase over the traffic counts in 2003. Assuming the traffic mix remains the same a 16% increase in traffic will result in a noise increase of less than 1 dB. This increase is small and generally not perceptible to most listeners.

Since the existing traffic noise at the project site currently exceeds FHWA guidelines for residences within 60 feet of Kamehameha Highway, the traffic noise after the new bridge is complete will also likely exceed the FHWA guidelines. However, since the traffic noise will not increase after the new bridge is complete, the impact of the project on traffic noise is not considered significant.

5.4 On-Site Equipment

Noise from pumps, air handling units, compressors, condensing units, and other on-site equipment must be addressed during the design phase of the project. Noise at the property line from on-site equipment must be within the State's maximum permissible sound limits for daytime and nighttime hours according to the applicable zoning district class as determined by the primary land use designation. If on-site equipment exceeds this limit, mitigation in the form of barriers, enclosures, silencers, etc. should be included in the design. Noise permits will also be required if noise from on site equipment exceeds the State noise limits.

6.0 REFERENCES:

1. Chapter 46, *Community Noise Control*, Department of Health, State of Hawaii, Administrative Rules, Title 11, September 23, 1996.

2. *Toward a National Strategy for Noise Control*, U.S. Environmental Protection Agency, April 1977.

3. *Department of Transportation, Federal Highway Administration Procedures for Abatement of Highway Traffic Noise,* Title 23, CFR, Chapter 1, Subchapter J, Part 772, 38 FR 15953, June 19, 1973; Revised at 47 FR 29654, July 8, 1982.

4. *Noise Analysis and Abatement Policy,* Department of Transportation, Highways Division, State of Hawaii, June 1977.

5. *Federal Highway Administration's Traffic Noise Model,* FHWA-RD-77-108; U.S. Department of Transportation, December 1978

APPENDIX A

ACOUSTICAL TERMINOLOGY

Sound Pressure Level

Sound or noise consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. It is measured in terms of decibels (dB) using precision instruments known as sound level meters. Noise is defined as "unwanted" sound.

Technically, sound pressure level (SPL) is defined as:

$$SPL = 20 \log (P/Pref) \text{ dB}$$

where P is the sound pressure fluctuation (above or below atmospheric pressure) and Pref is the reference pressure, 20 micropascals, which is approximately the lowest sound pressure that can be detected by the human ear. For example, if P is 20 micropascals, then SPL = 0 dB, or if P is 200 micropascals, then SPL = 20 dB. The relation between sound pressure in micropascals and sound pressure level in decibels (dB) is shown in Figure A-1.

The sound pressure level that results from a combination of noise sources is not the arithmetic sum of the individual sound levels, but rather the logarithmic sum. For example, two sound levels of 50 dB produce a combined level of 53 dB, not 100 dB; two sound levels of 40 and 50 dB produce a combined level of 50.4 dB.

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, in general, a change of 1 or 2 dB in the level of a sound is difficult for most people to detect. A 3 dB change is commonly taken as the smallest perceptible change and a 5 dB change corresponds to a noticeable change in loudness. A 10 dB increase or decrease in sound level corresponds to an approximate doubling or halving of loudness, respectively.

A-Weighted Sound Level

The human ear is more sensitive to sound in the frequency range of 250 Hertz (Hz) and higher, than in frequencies below 250 Hz. Due to this type of frequency response, a frequency weighting system, was developed to emulate the frequency response of the human ear. This system expresses sound levels in units of A-weighted decibels (dBA). A-weighted sound levels de-emphasizes the low frequency portion of the spectrum of a signal. The A-weighted level of a sound is a good measure of the loudness of that sound. Different sounds having the same A-weighted sound level are perceived as being about equally loud. Typical values of the A-weighted sound level of various noise sources are shown in Figure A-1.

Appendix A
Acoustical Terminology (Continued)

Statistical Sound Levels

The sound levels of long-term noise producing activities, such as traffic movement, aircraft operations, etc., can vary considerably with time. In order to obtain a single number rating of such a noise source, a statistically-based method of expressing sound or noise levels developed. It is known as the Exceedence Level, L_n. The Exceedence Level, L_n, represents the sound level which is exceeded for n% of the measurement time period. For example, $L_{10} = 60$ dBA indicates that for the duration at the measurement period, the sound level exceeded 60 dBA 10% of the time. Commonly used Exceedence Levels include L_1, L_{10}, L_{50}, and L_{90}, which are widely used to assess community and environmental noise. Figure A-2 illustrates the relationship between selected statistical noise levels.

Equivalent Sound Level

The Equivalent Sound Level, L_{eq}, represents a constant level of sound having the same total acoustic energy as that contained in the actual time-varying sound being measured over a specific time period. L_{eq} is commonly used to describe community noise, traffic noise, and hearing damage potential. It has units of dBA and is illustrated in Figure A-2.

Day-Night Equivalent Sound Level

The Day-Night Equivalent Sound Level, L_{dn}, is the Equivalent Sound Level, L_{eq}, measured over a 24-hour period. However, a 10 dB penalty is added to the noise levels recorded between 10 pm and 7 am to account for people's higher sensitivity to noise at night when the background noise level is typically lower. The L_{dn} is a commonly used noise descriptor in assessing land use compatibility, and is widely used by federal and local agencies and standards organizations. Qualitative descriptions, as well as local examples of L_{dn}, are shown in Figure A-3.

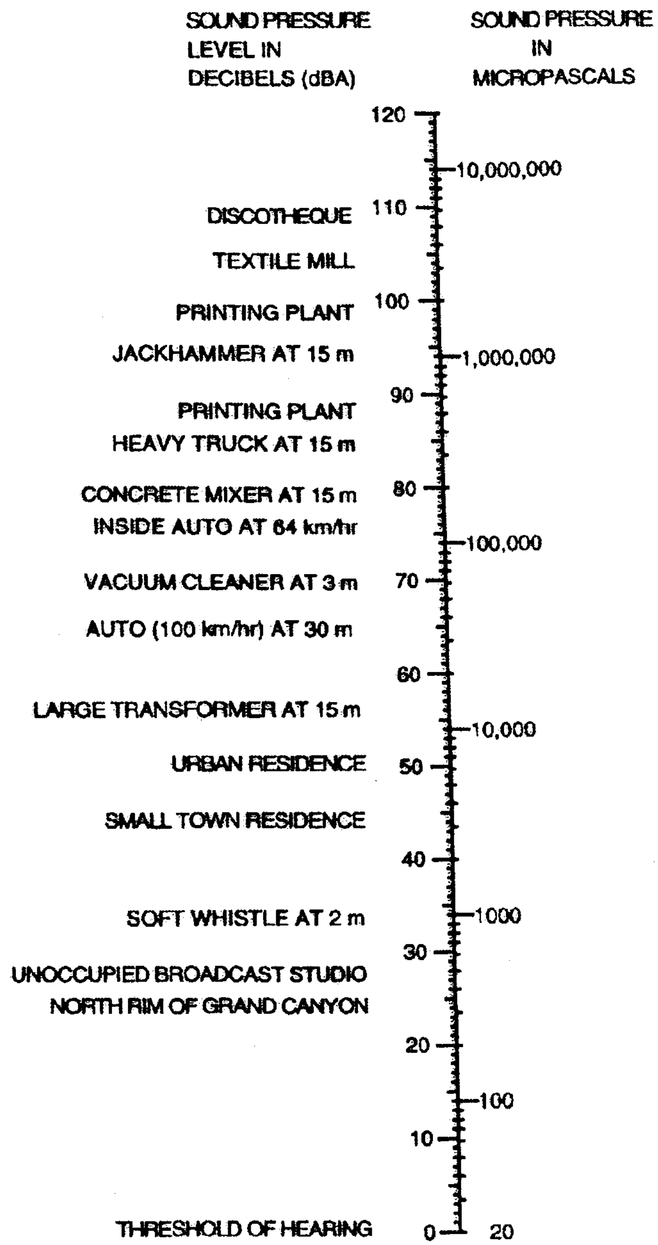

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FIGURE A-1 - THE RELATION BETWEEN SOUND PRESSURE, P, AND SOUND PRESSURE LEVEL, SPL. ALSO SHOWN ARE TYPICAL VALUES OF A-WEIGHTED SOUND LEVELS OF VARIOUS NOISE SOURCES.

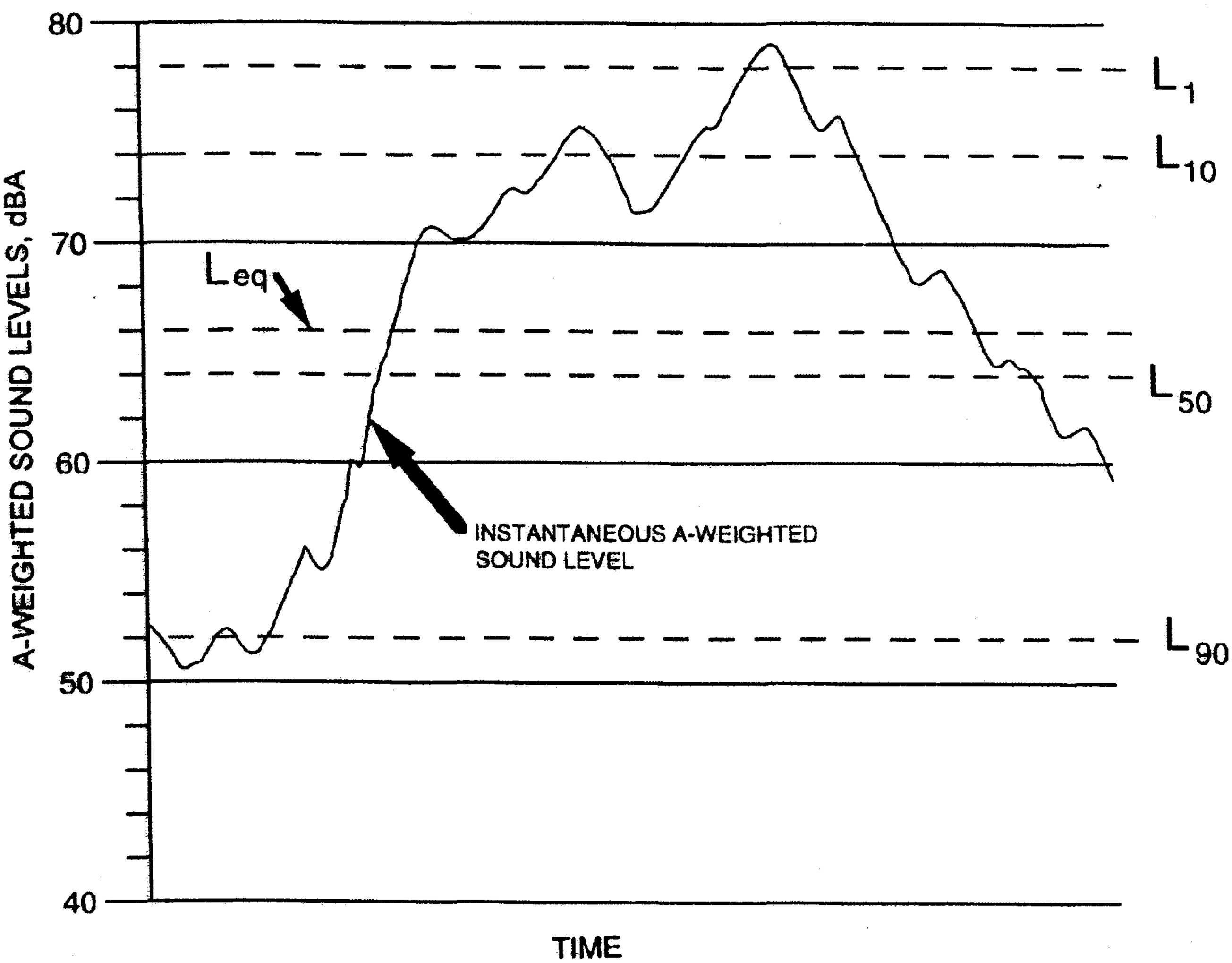

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FIGURE A-2 - COMPARISON OF AN INSTANTANEOUS SOUND LEVEL AND THE CORRESPONDING STATISTICAL SOUND LEVELS

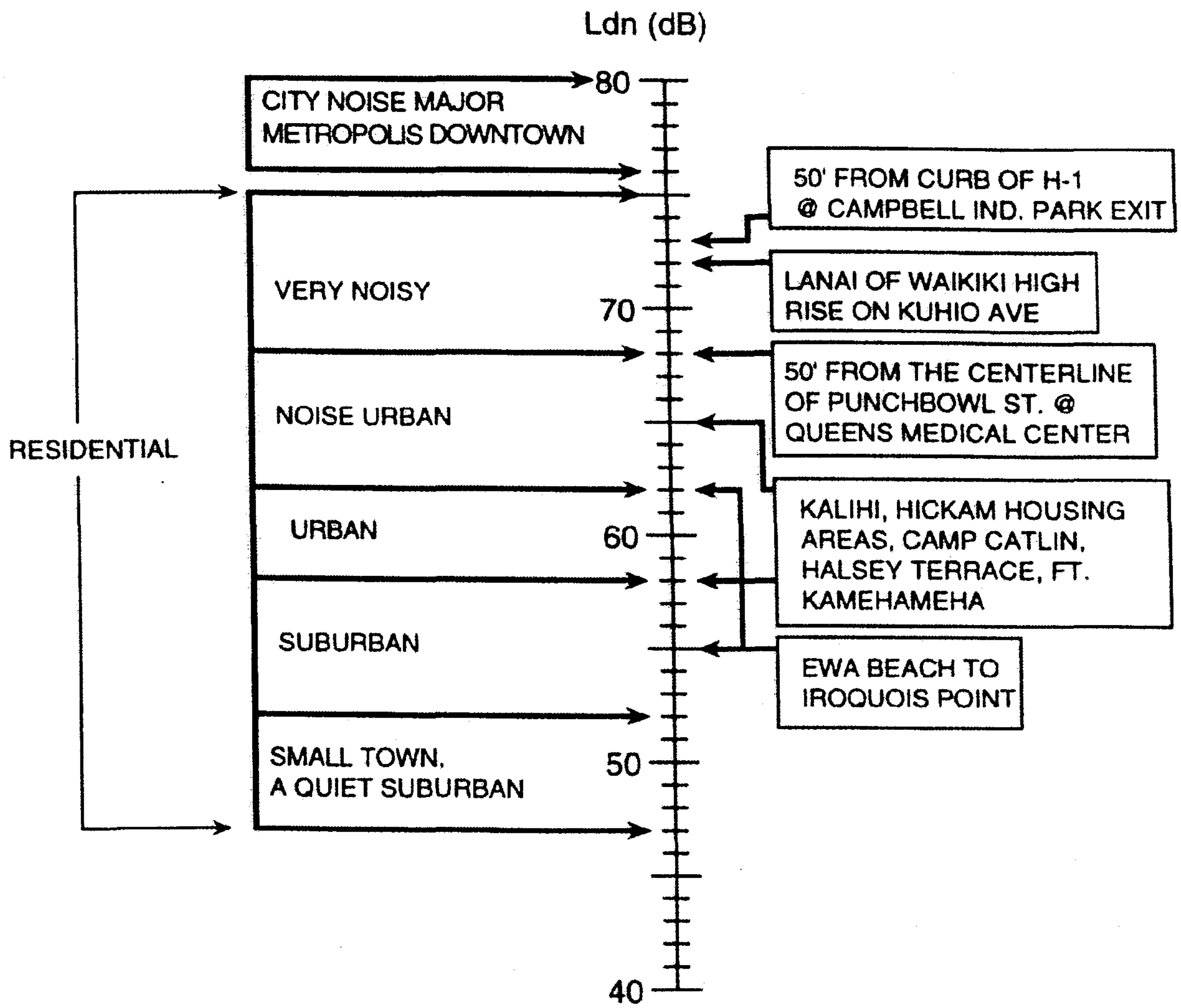

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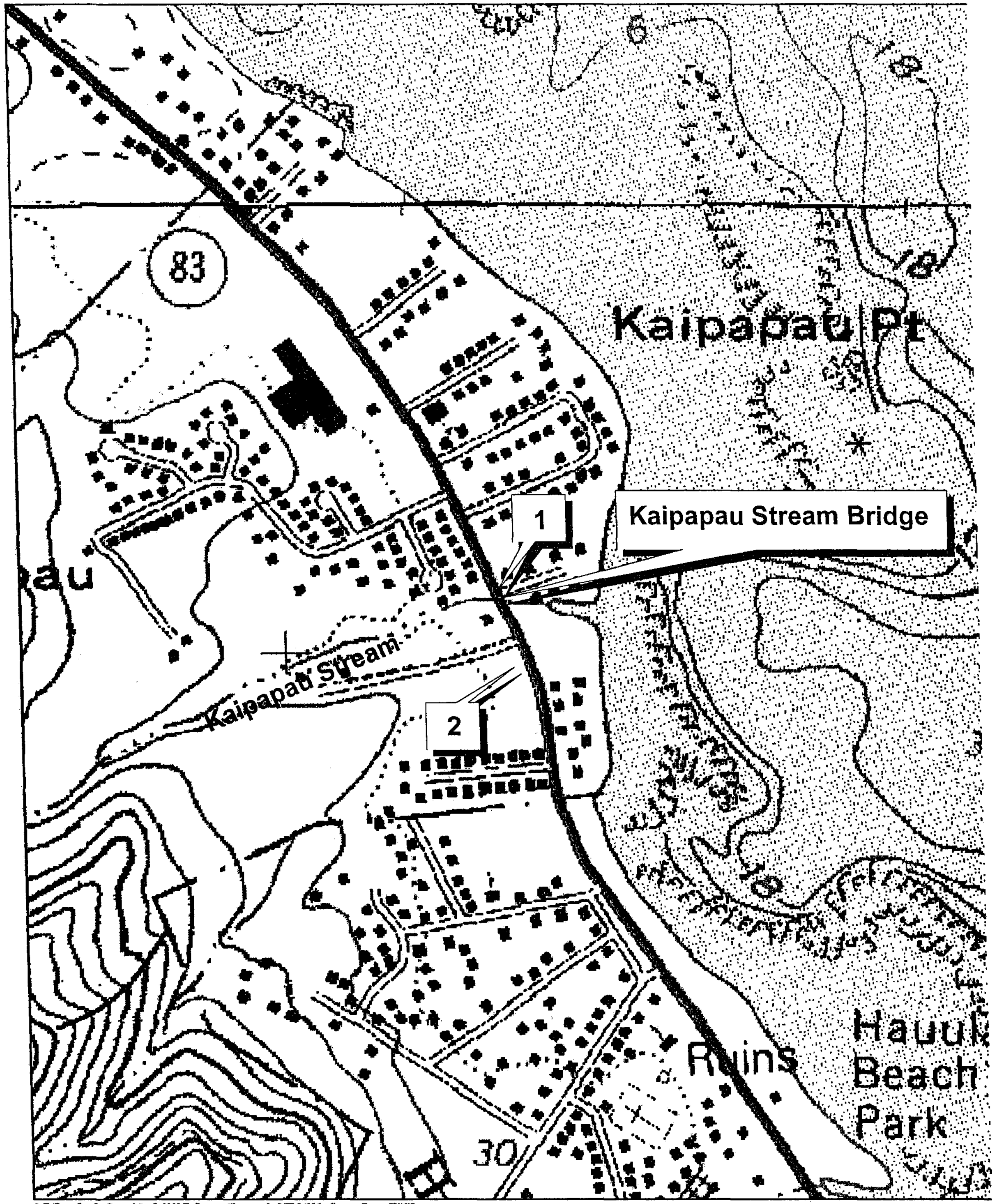
FIGURE A-3 - QUALITATIVE DESCRIPTION OF THE DAY-NIGHT EQUIVALENT SOUND LEVELS (Ldn) AND EXAMPLE Ldn's AT SELECTED LOCATIONS ON OAHU

TABLE 1
Federal Highways Administration Recommended Equivalent Hourly Sound Levels Based On Land Use [Reference 3]

Activity Category	$L_{eq(h)}$	Noise Reduction Exterior-to-Interior
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	---	Undeveloped Land
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.



3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 150 ft Scale: 1 : 6,400 Detail: 15-0 Datum: WGS84

1 Measurement Location

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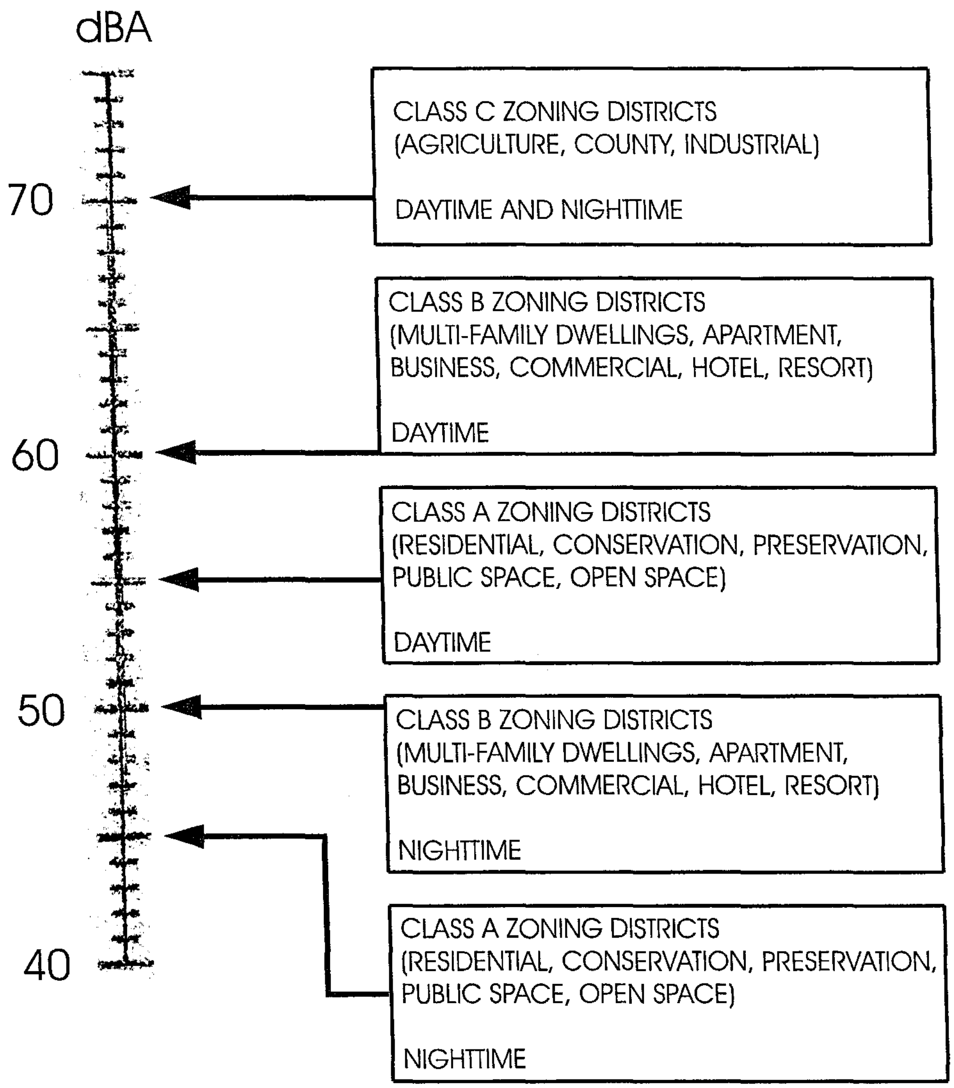
Map of Project Location			Figure No. 1
Kaipapau Stream Bridge Replacement			
not to scale			
Date April 6, 2004		Drawn By trb	



NOTE: SOUND LEVELS INDICATED BY ZONING DISTRICT ARE THE "MAXIMUM PERMISSIBLE" SOUND LEVELS DUE TO EXCESSIVE NOISE SOURCES SUCH AS STATIONARY MECHANICAL EQUIPMENT AND EQUIPMENT RELATED TO AGRICULTURAL, CONSTRUCTION AND INDUSTRIAL ACTIVITIES THAT SHALL NOT BE EXCEEDED FOR MORE THAN 10% OF THE TIME WITHIN ANY 20-MINUTE PERIOD DURING THE TIME PERIOD SHOWN.

(DAYTIME: 7:00 A.M. TO 10:00 P.M., NIGHTTIME: 10:00 P.M. TO 7:00 A.M.)

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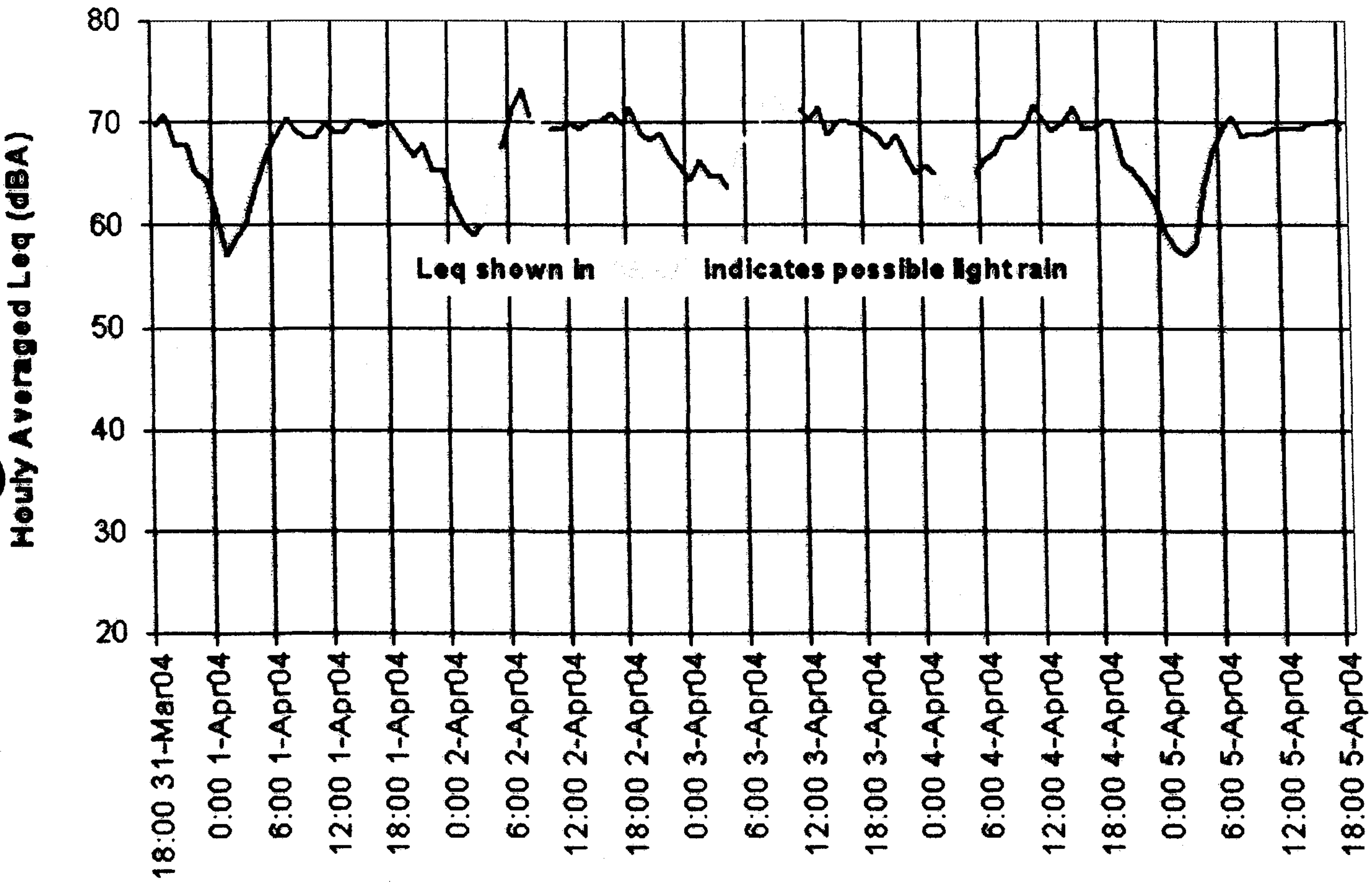
State of Hawaii Maximum Permissible Sound Levels for Various Zoning Districts			
Kaipapau Stream Bridge Replacement			Figure No. 2
not to scale			
Date April 6, 2004		Drawn By trb	



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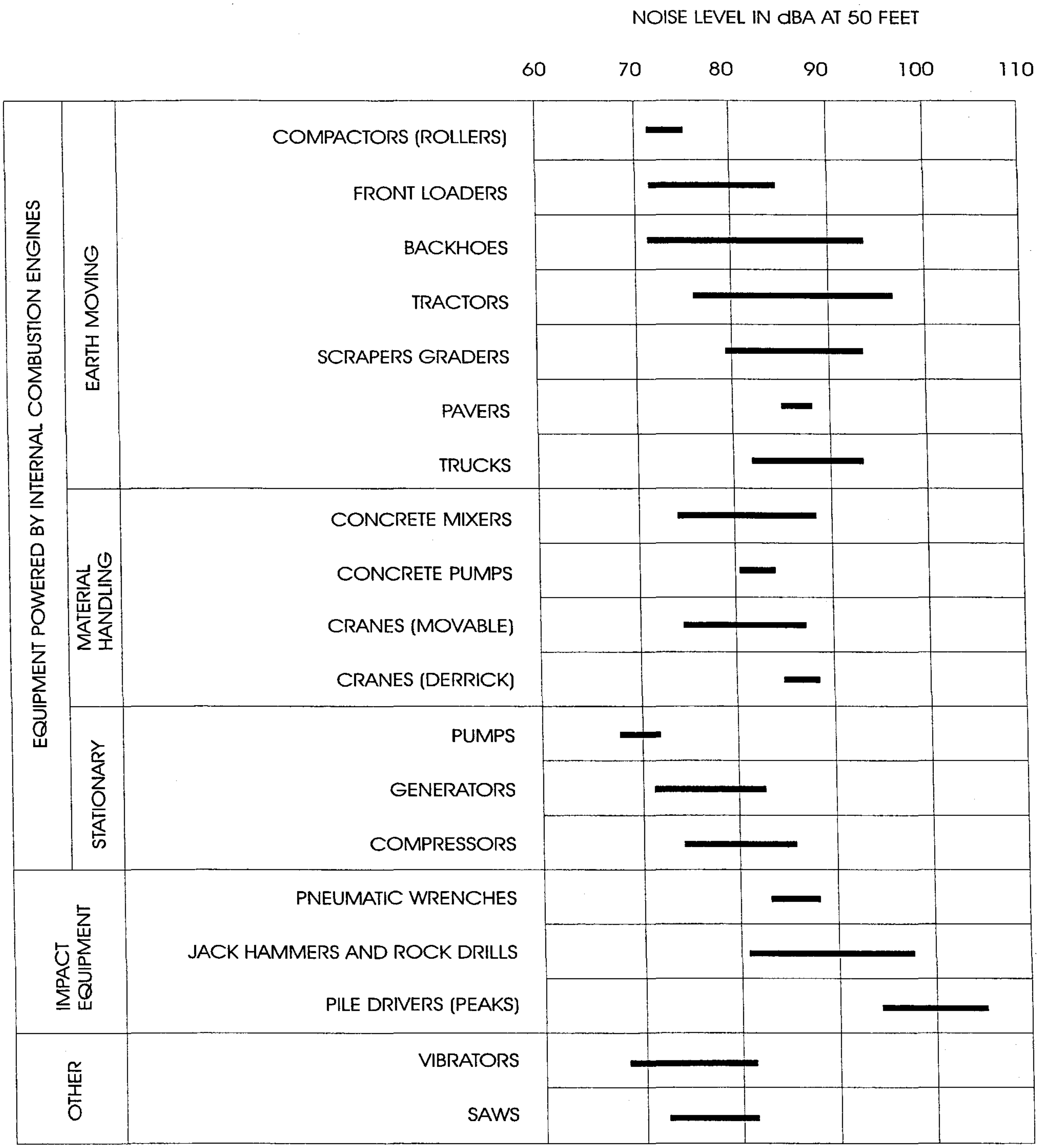
	Kaipapau Stream Bridge Replacement			Figure No. 3
	no scale			
	Date April 6, 2004		Drawn By trb	



NOTE: BASED ON LIMITED AVAILABLE DATA SAMPLES

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Typical Sound Levels from Construction Equipment			
Kaipapau Stream Bridge Replacement			Figure No. 4
no scale			
Date April 6, 2004		Drawn By trb	

Appendix D

Water Quality and Biological Reconnaissance Surveys of Lower Kaipapa‘u Stream Near Hau‘ula, O‘ahu

AECOS, Inc.

Water quality and biological reconnaissance surveys of lower Kaipapa`u Stream near Hau`ula, O`ahu[1]

October 1, 2004 *AECOS* No. 1060

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Introduction

The Hawaii Department of Transportation is planning to replace the Kaipapa`u Stream bridge on Kamehameha Highway in Hau`ula, along the windward coast of O`ahu. It is proposed that the bridge will be replaced within the highway right-of-way ~~and without a need to build structures in the stream channel.~~ Please see note in Reference.

On May 14, 2004, two *AECOS* biologists conducted a reconnaissance survey of Kaipapa`u Stream at Kamehameha Highway on the windward coast of O`ahu (Figure 1). The purpose of the survey was to ascertain biological resources found around the Kamehameha Highway Bridge. This report presents the findings of that survey.

General Site Description

Kaipapa`u Stream, State Perennial Stream ID No. 3-1-10, is an interrupted perennial stream that originates in the northern section of the Ko`olau Mountain and descends from an elevation of around 2600 ft (792 m). An interrupted perennial stream is one that flows year-round in the upper reaches and only intermittently at lower elevations. Kaipapa`u Stream flows under Kamehameha Highway and discharges at the shore between Kaipapa`u Point and Hau`ula Beach Park. A fringing coral reef lies offshore.

In the vicinity of Kamehameha Highway, Kaipapa`u Stream is channelized and the banks are hardened in most places. Upstream from the bridge, the left bank of the stream is hardened and yards of neighboring houses abut the wall. The right bank of the stream is an eroding soil bank vegetated with elephant grass (*Pennistum purpureum*). Further upstream, the boulder-bottom stream narrows as it climbs up into the valley. Immediately upstream from the bridge, the stream widens as it flows

[1] This report was prepared for use by RM Towill Corporation in an Environmental Assessment to replace the bridge along Kamehameha Highway in Hau`ula, O`ahu. The EA will become part of the public record.

nearly parallel to the bridge. At the time of our survey, the stream was flowing under the right side of the bridge because the left underpass was clogged with broken tree branches (Figure 2). There is a deep pool under the right side of the bridge and then the stream drops slightly and widens as it flows the short distance to the ocean (Figure 3). It is clear that this section of the stream has been channelized, as it flows between houses with large yards and sections of the banks are hardened.

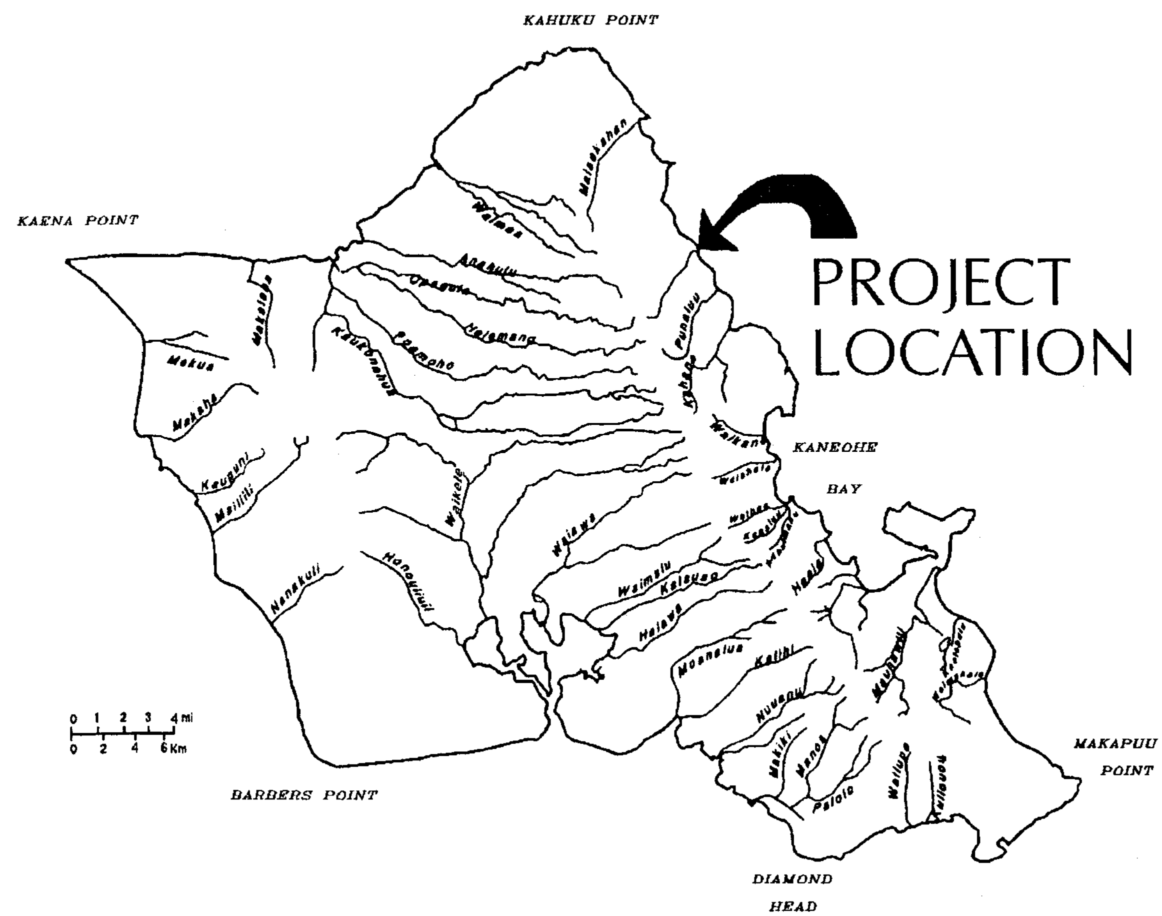

Figure 1. Project location on the Island of O`ahu.

Vegetation

Typical weedy or ruderal plant species and coastal plants were observed in the vicinity of the stream and bridge. False *kamani* (*Terminalia catappa*) and coconut palms (*Cocos nucifera*) were growing near the road and along the stream banks. Umbrella sedge (*Cyperus alternifolius*) and para grass (*Brachiaria mutica*) were growing on the

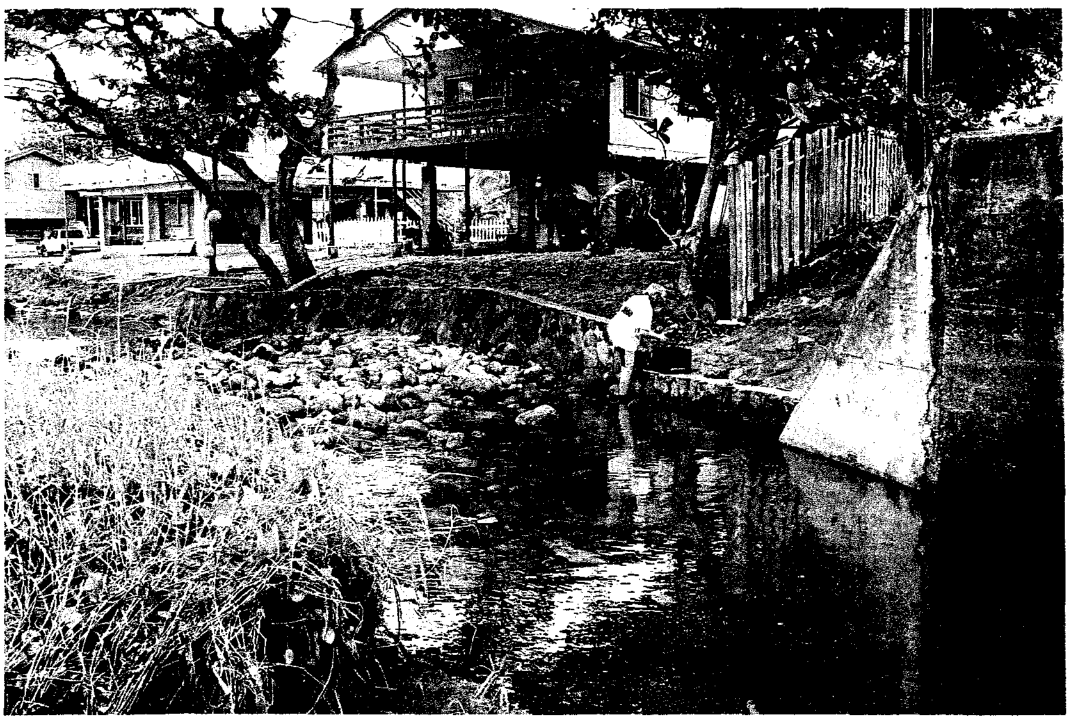

Figure 2. Kaipapa`u Stream upstream from Kamehameha Highway Bridge. Note the significant log jam on the left side of the bridge.
Figure 3. Kaipapa`u Stream at water quality sampling Station 1, downstream from Kamehameha Highway Bridge.

banks and on a sandbar just downstream from the bridge. *Naupaka kahakai* (*Scaevola sericea*), wedelia (*Sphagneticola trilobata*), seashore rushgrass (*Sporobolus virginicus*), and beach morning glory (*Ipomoea pes-caprae*), along with several common ornamental plants were growing throughout the project area. None of these 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, 1999a, b, 2001) and can be replanted when the construction is completed.

Water Quality

On May 14, 2004, *AECOS* biologists collected water samples from three sites around the Kamehameha Bridge on Kaipapa`u Stream. Station 1 was located approximately 12 m downstream from the bridge, Station 2 was located approximately 10 m upstream from the bridge, and Station 3 was located near the shoreline even with the *makai* end of the left bank rock wall. 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 (laboratory Log No. 18741). Table 1 lists field instruments and analytical methods used with these samples.

Stations 1 and 2 were located in the freshwater section of the stream and Station 3 was located near the coast where stream flow and coastal marine waters can mix. The parameters measured at Station 3 can be expected to vary over time as the tide rises and falls and as stream flow increases and decreases dependent upon rainfall in the watershed. The results for the morning of May 14, 2004 correspond in time with a flooding tide, with the a low tide of 0.2 ft (lower low water or LLW) at 05:47 am and a high tide of 1.6 ft (lower high water or LHW) at 13:30 (NOAA, 2004) and heavy rainfall near the headwaters of the stream in the mountains. The water quality of the stream in the project area is dominated by outflow from Kaipapa`u Stream.

The primary purpose of the May 14, 2004 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 total suspended solids are based upon geometric mean values and a minimum of three separate samples per location would be needed to compute a geometric mean (HDOH, 2000). Nonetheless, our results can be evaluated against the water quality criteria for streams (Table 2) as long as limitations regarding a possible lack of representativeness are realized.

The analyses of the water quality samples collected from Kaipapa`u Stream on May 14, 2004 (Table 3) show normal temperature and pH values, with relatively low percent saturation of dissolved oxygen. Turbidity levels and TSS concentrations were very low. Ammonia and total phosphorus levels were low, but high nitrate+nitrite levels elevated the total nitrogen levels as well.

Table 1. Analytical methods and instruments used for the May 14, 2004 water quality sampling of Kaipapa`u Stream near Hau`ula, O`ahu.

Analysis	Method	Reference	Instrument
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 550 DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
Temperature	thermister calibrated to NBS cert. thermometer (EPA 170.1)	EPA (1979)	YSI Model 550 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 2100P 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.

Despite the fairly rapid stream flow, the water was not well saturated with dissolved oxygen (70 - 76 %), falling short of the percent saturation of dissolved oxygen criterion established by the State Department of Health (> 80%) (HIDOH, 2000). This result is somewhat unusual considering the water was fresh and moving. Values recorded for turbidity (1.98 - 2.02 ntu) and TSS concentrations (0.3 - 8 mg/l) were very low, demonstrating the value of an intact forest in the upper watershed in maintaining good water quality. Although ammonia levels were low (5 µg/l at Station 2 and not detected in the other two samples), concentrations of the other component of inorganic nitrogen, nitrate + nitrite, were high (246 - 319 µg/L) and accounted for the majority of the total nitrogen concentrations (284 - 403 µg/L). Total phosphorus levels were low (17 - 23 µg/L).

Table 2. State of Hawaii geometric mean criteria for streams (HAR §11-54-05.2(b)(1)).

Total Nitrogen (µg N/l)	**Nitrate + Nitrite Nitrogen (µg N/l)**	**Total Phosphorus (µg P/l)**	**Total Suspended Solids (mg/l)**	**Turbidity NTU**
250.0*	70.0*	50.0*	20.0*	5.0*
180.0**	30.0**	30.0**	10.0**	2.0**

* wet season - November 1 through April 30.
** dry season - May 1 through October 31

- pH - not vary more than 0.5 units from ambient and not be lower than 5.5 nor higher than 8.0.
- Dissolved oxygen - not less than 80% saturation.
- Temperature - not vary more than 1 °C from ambient.
- Specific conductance - not more than 300 µmhos/cm.

Table 3. Water quality characteristics of Kaipapa`u Stream from samples taken on March 14, 2004.

	Time	**Temp. (°C)**	**DO (mg/l)**	**DO % sat**	**pH (pH units)**	**Salinity (ppt)**
Station 1	0950	22.0	6.11	70	7.06	<1
Station 2	1100	22.7	6.34	74	7.52	<1
Station 3	1010	23.3	6.43	76	7.42	<1
	Turbidity (ntu)	**TSS (mg/l)**	**Ammonia (µg N/l)**	**Nitrate + nitrite (µg N/l)**	**Total N (µg N/l)**	**Total P (µg P/l)**
Station 1	1.98	0.3	<1	304	335	20
Station 2	2.12	8	5	319	403	23
Station 3	2.02	0.7	<1	246	284	17

Aquatic Biota

Observations during this survey were limited to the vicinity of the Kamehameha Highway Bridge and a short distance upstream and downstream of the bridge. Even though the Hawaii Stream Assessment ranks Kaipapa`u Stream as having "limited" aquatic resources (Hawaii Cooperative Park Service Unit, 1990), recent studies have found the stream to be one of the best in this regard on O`ahu (Englund, 2000). The upper watershed of Kaipapa`u Stream is largely undeveloped and consists of native forest. The riparian vegetation, aquatic habitats, and assemblages of native aquatic insects are of the highest quality on O`ahu and the stream should be considered one of the best remaining in the Hawaiian archipelago (Englund, 2000).

Our brief survey revealed quite a few aquatic species in the lower reach (Table 4). The prawn and goboid fishes are anadromous, meaning that they migrate to and from the ocean. The estuary is a gathering point for the juvenile *`o`opu*, which then migrate upstream as they grow larger. *`Opae `oeha`a* are common native residents (remain as adults) in the estuarine environment, and the *`ama `ama* and *aholehole* reside in the estuary as juveniles and migrate into the ocean as they grow. A large school of tilapia resides in the deep pool under the right side of the bridge. We made a possible sighting of the relatively rare (on O`ahu) *`o`opu nopili* (*Sicypoterus stimpsoni*), although we were unable to make a definitive species determination.

Table 4. Checklist of aquatic biota observed in the lower reach of Kaipapa`u Stream at the Kamehameha Highway Bridge.

	INVERTEBRATES			
MOLLUSCA, GASTROPODA	(mollusks)			
NERITIDAE				
Neritina vespertina Sowerby	*hapawai* (adults & eggs)	**end**	10	U
ARTHROPODA, CRUSTACEA	(crustaceans)			
PALIEMONIDAE				
Macrobranchium grandimanus (Randall)	*`opae `oeha `a*	**end**	10	U
	VERTEBRATES			
VERTEBRATA, PISCES	(fishes)			
CICHLIDAE				
Sarotherodon sp.	tilapia	nat	10	C
GOBIIDAE				
Awaous guamensis (Valenciennes)	*`o`opu nakea*	**ind**	10	O
Stenogobius hawaiiensis Watson	*`o`opu naniha*	**end**	10	C
?*Sicypoterus stimpsoni* (Gill)	*`o`opu nopili*	**end**	10	R
KUHLIIDAE				
Kuhlia sandvicensis (Steindachner)	*aholehole*	**end**	10	C
MUGILIDAE				
Mugil cephalus L.	*`ama `ama*	**ind**	10	C
POECILIIDAE				
Gambusia affinis (Baird & Girard)	mosquitofish	nat	10	U
Poecilia mexicana (Steindachner)	Mexican molly	nat	10	O

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 May 14, 2004.
20 - Collected; identified in the laboratory; specimen(s) not saved.

Abundance categories:
R - Rare - only one or two individuals seen.
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.
P - Present - noted as occurring, but quantitative information lacking.

Typical intertidal and subtidal invertebrates (mussels and oysters, *Theodoxus cariosus, Nerita picea*, and *Littoraria pintado*) were observed close to the shore, but a fair distance from the project area. *Scylla serrata* (Samoan crab), *`o`io* or bonefish (Albulidae), and a *Trachemys scripta elegans* (red-eared slider turtle) were reported by neighbors as being present downstream from the bridge close to the shore.

Discussion

The bridge proposed for this site will be replaced within the highway right-of-way.~~and without needing to build structures in the stream~~;* therefore, water quality impacts to the stream and nearshore environment can be largely avoided. None of the area vegetation is threatened or endangered and this construction project provides the opportunity to replace some of the non-native vegetation with more desirable strand trees and shrubs, such as *naupaka* (*Scaevola sericea*), *kamani* (*Calophyllum inophyllum*), *hala* (*Pandanus tectorius*), and *niu* or coconut.

The new bridge design should consider enlarging the openings under the bridge to prevent "log jams," which can result in erosion elsewhere along the stream. Elimination of potential log jams will likely also enhance habitat and passage for some of the native animals such as the *`opae `oeha `a, `o`opu nopili*, and other gobies and minimize the habitat for tilapia.

Some fishing and possibly limu collection occurs just off the shore in this area. It will be important to this user group that the quality of the water in Kaipapa`u Stream is maintained and does not affect their activities.

* See Reference section below.

References Cited

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.

Englund, R.A. 2000. Report on aquatic insect monitoring of 17 September 2000 in Kipapa`u Stream, O`ahu, Hawai`i. Prep. for Oceanit Laboratories, Inc.

Contribution No. 2000-020 to the Hawaii Biological Survey. 7 pp. (http://hbs.bishopmuseum.org/pdf/kaipapau.pdf)

Federal Register. 1999a. Department of the Interior, Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 - December 3, 1999.

______. 1999b. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions. *Federal Register*, 64 (205 (Monday, October 25, 1999)): 57534-57547.

------. 2001. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Notice of Findings on Recycled Petitions. *Federal Register*, 66 No. 5 (Monday, January 8, 2001): 1295 - 1300.

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.

National Oceanographic and Atmospheric Administration (NOAA). 2004. Tide predictions. Website URL: http://co-ops.nos.noaa.gov/tides04/tab2wc3.html#167.

NOTE:

* Since initial study, plans include the construction of piers in the stream.

Water quality and biological reconnaissance surveys of lower Kaipapa`u Stream near Hau`ula, O`ahu[1]

October 1, 2004 *AECOS* No. 1060

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Introduction

The Hawaii Department of Transportation is planning to replace the Kaipapa`u Stream bridge on Kamehameha Highway in Hau`ula, along the windward coast of O`ahu. It is proposed that the bridge will be replaced within the highway right-of-way and without a need to build structures in the stream channel.

On May 14, 2004, two *AECOS* biologists conducted a reconnaissance survey of Kaipapa`u Stream at Kamehameha Highway on the windward coast of O`ahu (Figure 1). The purpose of the survey was to ascertain biological resources found around the Kamehameha Highway Bridge. This report presents the findings of that survey.

General Site Description

Kaipapa`u Stream, State Perennial Stream ID No. 3-1-10, is an interrupted perennial stream that originates in the northern section of the Ko`olau Mountain and descends from an elevation of around 2600 ft (792 m). An interrupted perennial stream is one that flows year-round in the upper reaches and only intermittently at lower elevations. Kaipapa`u Stream flows under Kamehameha Highway and discharges at the shore between Kaipapa`u Point and Hau`ula Beach Park. A fringing coral reef lies offshore.

In the vicinity of Kamehameha Highway, Kaipapa`u Stream is channelized and the banks are hardened in most places. Upstream from the bridge, the left bank of the stream is hardened and yards of neighboring houses abut the wall. The right bank of the stream is an eroding soil bank vegetated with elephant grass (*Pennistum purpureum*). Further upstream, the boulder-bottom stream narrows as it climbs up into the valley. Immediately upstream from the bridge, the stream widens as it flows

[1] This report was prepared for use by RM Towill Corporation in an Environmental Assessment to replace the bridge along Kamehameha Highway in Hau`ula, O`ahu. The EA will become part of the public record.

Abundance categories:
R - Rare - only one or two individuals seen.
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.
P - Present - noted as occurring, but quantitative information lacking.

Typical intertidal and subtidal invertebrates (mussels and oysters, *Theodoxus cariosus*, *Nerita picea*, and *Littoraria pintado*) were observed close to the shore, but a fair distance from the project area. *Scylla serrata* (Samoan crab), *`o`io* or bonefish (Albulidae), and a *Trachemys scripta elegans* (red-eared slider turtle) were reported by neighbors as being present downstream from the bridge close to the shore.

Discussion

The bridge proposed for this site will be replaced within the highway right-of-way and without needing to build structures in the stream; therefore, water quality impacts to the stream and nearshore environment can be largely avoided. None of the area vegetation is threatened or endangered and this construction project provides the opportunity to replace some of the non-native vegetation with more desirable strand trees and shrubs, such as *naupaka* (*Scaevola sericea*), *kamani* (*Calophyllum inophyllum*), *hala* (*Pandanus tectorius*), and *niu* or coconut.

The new bridge design should consider enlarging the openings under the bridge to prevent "log jams," which can result in erosion elsewhere along the stream. Elimination of potential log jams will likely also enhance habitat and passage for some of the native animals such as the *`opae `oeha `a, `o`opu nopili*, and other gobies and minimize the habitat for tilapia.

Some fishing and possibly limu collection occurs just off the shore in this area. It will be important to this user group that the quality of the water in Kaipapa`u Stream is maintained and does not affect their activities.

References Cited

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.

Englund, R.A. 2000. Report on aquatic insect monitoring of 17 September 2000 in Kipapa`u Stream, O`ahu, Hawai`i. Prep. for Oceanit Laboratories, Inc.

Contribution No. 2000-020 to the Hawaii Biological Survey. 7 pp. (http://hbs.bishopmuseum.org/pdf/kaipapau.pdf)

Federal Register. 1999a. Department of the Interior, Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 - December 3, 1999.

______. 1999b. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions. *Federal Register*, 64 (205 (Monday, October 25, 1999)): 57534-57547.

------. 2001. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Notice of Findings on Recycled Petitions. *Federal Register*, 66 No. 5 (Monday, January 8, 2001): 1295 - 1300.

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.

National Oceanographic and Atmospheric Administration (NOAA). 2004. Tide predictions. Website URL: http://co-ops.nos.noaa.gov/tides04/tab2wc3.html#167.

Appendix E

State Historic Preservation Division Correspondence

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DESIGN BRANCH
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HIGHWAYS DIVISION

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DEPARTMENT OF TRANSPORTATION
HIGHWAY-DD

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 6, 2006

Glenn M Yasui, Administrator
Department of Transportation – Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

LOG NO: 2006.2157
DOC NO: 0607BF09
Architecture

Dear Mr. Yasui:

SUBJECT: Section 106 (NHPA) Review
RE: Kaipapau Stream Bridge Replacement_HWY – DB 2.0785
Project Location: Kamehameha Highway, Oahu
Hauula Ahupuaa, Koolauloa District, Oahu
TMK: (1) 5-4-11

This letter is in response to your letter dated April 25, 2006 which we received on April 24, 2006.

The SHPD has reviewed your letter initiating the Section 106 process for the proposed replacement of the Kaipapau Stream Bridge. The proposed project entails the demolition of the extant Kaipapau Stream Bridge and replacing it with a 100 – foot long by 57 – foot wide, pre – stressed concrete plank bridge with a cast-in-place bridge deck.

The 1983 *Historic Bridge Inventory, Island of Oahu* identified this particular bridge as having poor aesthetics and poor integrity. However, the inventory identified the bridge as significant due for its transportation link of the Windward communities and because of it was built by one of Honolulu's prominent builders, L. L. McCandless.

The SHPD concludes that the proposed project will have no adverse effect with the condition that the bridge be photographed before demolition. These photographs may be in digital or print format.

Thank you for the opportunity to comment. Should you have any questions regarding architectural concerns please call Bryan Flower at our Oahu office at (808) 692-8028.

Sincerely,

Peter T. Young, Chairperson
State Historic Preservation Officer

BF:jen

HWY 1018

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

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AQUATIC RESOURCES
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LAND
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2006 MAR -6 P 3:38
HIGHWAYS DIVISION
L O / DT

MAR - 3 2006

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Mr. Glenn M. Yasui, Administrator
Highways Division, State of Hawaii, Department of Transportation
869 Punchbowl Street
Honolulu, Hawai'i 96813

LOG NO: 2006.0371
DOC NO: 0602ST16
Architecture

Dear Mr. Yasui:

SUBJECT: **Section 106 (NHPA) Review**
Kamehameha Highway – Kaipapa'u Stream Bridge Replacement
State Route 83
Federal Aid Project No. BR-083-1(48)
HWY-DD 2.9944
Hauula, Koolauoa District, Oahu, Hawai'i,
TMK (1) 5-4-018:001 and :002, 5-4-011:004 and :021

Thank you for your submittal received February 10, 2006 informing us of the proposed project for the replacement of the Kaipapa'u Stream Bridge with improved roadway shoulders, guardrails, and drainage features. The Bridge is located on Kamehameha Highway, State Route 83, in Hauula, Oahu. The project intends to replace the Bridge to ensure that the new structure meets Federal and State bridge and roadway standards.

The Kaipapa'u Stream Bridge, constructed in 1932, has a National Bridge Inventory rating of 37. It is not listed on the State of Hawai'i, Draft Historic Bridge Inventory and Evaluation (May 1996). It is listed on the Historic Bridge Inventory , Island of Oahu (June 1983), and is significant as an important transportation link for Windward communities. It is associated with one of Honolulu's prominent builders, L. L. McCandless. As a prolific builder, he constructed five miles of road and seven bridges from Hau'ula to Kahuku. The seven bridges are Laiewai, Laiemaloo, Kaipapa'u, Waipilopilo, Muliwai, Hauula, and Waipuhi Bridges.

Before a determination can be made, we request submittal to SHPD that all options have been explored. We request a structural report for the Bridge's condition, photographs of the Bridge, and conditions of the other six bridges built by L. L. McCandless for an assessment of the best examples of his work.

Thank you for the opportunity to comment. Should you have any questions regarding architectural concerns please call Susan Tasaki at our Oahu office at (808) 692-8032.

Sincerely,

for Peter T. Young, Chair
State Historic Preservation Officer

ST:jen

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
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Surveying
Construction Management

Letter of Transmittal

To State Historic Preservation Division

Address 601 Kamokila Boulevard, Suite 555
Kapolei, Hawaii 96707

Attention Melanie Chinen, Administrator

Date 2-9-06

Fax Number

Project Section 106 Consultation, Kaipapapu Stream Bridge Replacement

RMTC Project Number 1-19548-00

Sending

☒ Attached ☐ Under Separate Cover ☐ Via Facsimile

☐ Drawing Prints ☐ Drawing Originals ☐ Specifications ☐ Other Bound Material

☐ Cost Estimate ☐ Change/Field Order ☐ Digital Files

Pages sent including cover she

☐ Originals will be mailed

Number of Copies	Description
1	Section 106 Consultation Letter from the State Department of Transportation, Kamehameha Highway, Kaipapa'u Stream Bridge Relpacement, Ko'olauloa, Oahu, Hawaii

Action

☐ Approval ☒ Review and Comment ☐ Your Use

☐ Signature and Return To This Office ☐ As Requested ☐ Appropriate Action

Remarks

Dear Ms. Chinen:

Attached please find the Section 106 Consultation letter from the State Department of Transportation (SDOT) to your office.

The letter asks for written comments to be submitted to SDOT 30 days from the date of the letter. It is dated January 19, 2006; There was a delay in sending out this letter.

Please submit your written comments to SDOT by Friday, MARCH 10, 2006.

Should you have any questions, please contact me at 842-1133.

Thank you.

Copies to RMTC
cc SDOT

By Chester Koga

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:
HWY-DD 2.9944

January 19, 2006

TO: MELANIE CHINEN, ADMINISTRATOR
HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

ATTN: DAVID LAWRENCE BROWN, CHIEF
CULTURE AND HISTORY BRANCH

FROM: GLENN M. YASUI
ADMINISTRATOR, HIGHWAYS DIVISION

SUBJECT: KAMEHAMEHA HIGHWAY, KAIPAPAU STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48) SECTION 106 CONSULTATION

The State of Hawaii, Department of Transportation, Highways Division, in cooperation with the Federal Highway Administration, proposes to replace the Kaipapau Stream Bridge with improved roadway shoulders, guardrails, and drainage features to meet American Association of State Highway and Transportation Officials (AASHTO) bridge standards. The project is located on Kamehameha Highway, State Route 83, in Hauula, Koolauloa District. See enclosed location map.

The purpose of this project is to fulfill a mandate to maintain the functional and structural integrity of bridges on State roadways. In fulfillment of this mandate, it is recommended that this bridge be replaced to meet current standards for roadway widths and safety features as specified by AASHTO and current design criteria. The Kaipapau Stream Bridge has a rating of 37 (based on a scale of 1-100) on the National Bridge Inventory and warranted a replacement. Current standards for highway speed, loading, sight distances, guardrails, and other safety measures will be used in the design of the project. Construction is anticipated to start in early 2008, with completion in 2009.

As part of the overall planning effort, we are soliciting comments in accordance with Section 106 of the National Historic Preservation Act (NHPA) to ascertain if there are historic properties that will be impacted by this proposed project. We request your comments, if any, on the proposed bridge replacement work. It is our preliminary determination that this project will have no adverse impacts on archaeological or historic resources. Please submit any written comments to us within 30 days from the date of this letter.

We appreciate your review of the subject materials. Please contact Li Nah Okita at 692-7581 or Duane Taniguchi at 692-7582 of our Highways Division, Design Section if there are any questions.

Enclosure

PROJECT SUMMARY
Kaipapa'u Stream Bridge Replacement Project
Hau'ula, Ko'olauloa District, O'ahu
December 5, 2005

PROJECT OVERVIEW

The Kaipapa'u Stream Bridge is located on Kamehameha Highway, State Route 83, Hau'ula, Ko'olauloa, O'ahu **(Figure 1, Project Location and Vicinity Map)**. This project is one in a series of bridge replacements being implemented by the State Department of Transportation (SDOT-H) and Federal Highway Administration (FHWA) along the windward coast of O'ahu. Replacement of the bridge will ensure that the structure meets Federal and State bridge and roadway standards.

Proposed work includes construction of a 110-foot long by 57-foot wide, pre-stressed concrete plank bridge with cast-in-place bridge deck **(Figure 2, Project Plan)**. The replacement bridge will also include bicycle and pedestrian facilities. Current standards for highway speed, loading, sight distances, guard railings, and other safety measures will be used in the design of the project. Construction is schedule to begin in early 2008.

Because State of Hawai'i and Federal (FHWA) funds will be used for development, this project is subject to preparation of environmental documentation in compliance with requirements of Chapter 200, Title 11, Hawai'i Administrative Rules (HAR), Chapter 343, Hawai'i Revised Statutes (HRS), and the National Environmental Policy Act (NEPA). In addition, consultation in accordance with Section 106, National Historic Preservation Act, is also being conducted to ascertain if there are historic properties being impacted by the proposed project.

PURPOSE AND NEED FOR PROJECT

SDOT-H is mandated to maintain the functional and structural integrity of bridges on State roadways. Based on the current bridge replacement program of SDOT-H, the Kaipapa'u Stream Bridge facility has a National Bridge Inventory (NBI) rating of 37 based on a scale of 1-100. This NBI rating warrants rehabilitation or replacement of the bridge. The bridge replacement is needed to mitigate bridge maintenance concerns, increase traffic safety (for motorists and pedestrians) and meet the projected vehicle usage of the Kamehameha Highway.

EXISTING CONDITIONS

The Kaipapa'u Stream Bridge carries inbound and outbound traffic on Kamehameha Highway near milepost 20.99. The existing bridge was constructed in 1932 and is 82 feet long by 28.4 feet wide. The bridge is considered a historical structure because of its age, although it is not listed on the State

Draft Historic Bridge Inventory and Evaluation, dated May 1996. The existing bridge has two 40-foot spans and is constructed from reinforced concrete with a wooden pedestrian walkway attached to the mauka (west) side of the bridge. At the existing bridge, Kamehameha Highway has 12-foot approach lanes with paved shoulders in both directions and a current speed limit of 35 miles per hour.

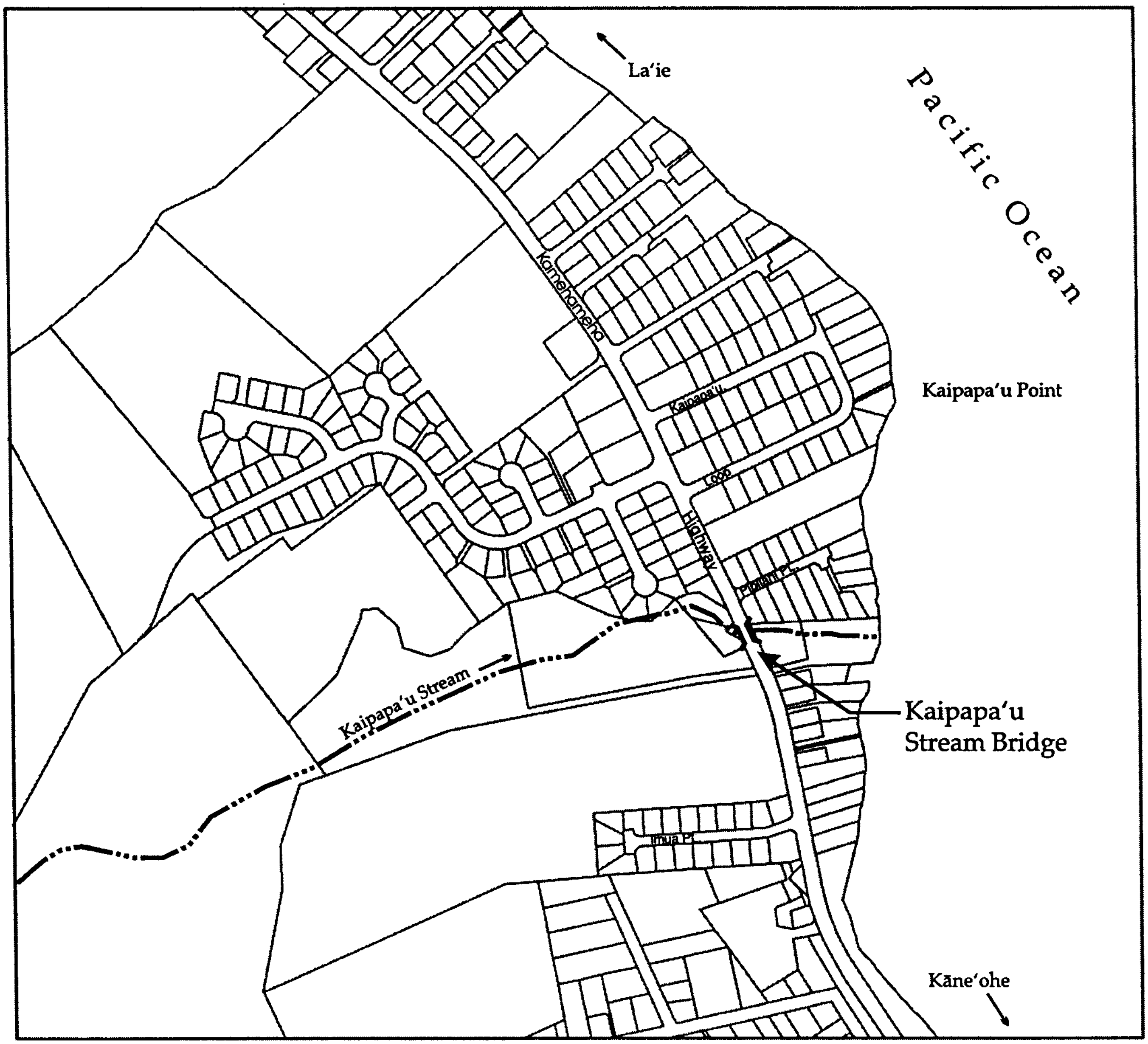
Lands surrounding the bridge are single family residential and commercial and are privately owned. Several blocks to the north of the bridge is the Hau'ula Shopping Center, a strip mall with retail space and a parking lot. Parcels immediately surrounding Kaipapa'u Stream Bridge are single family residences.

TECHNICAL CHARACTERISTICS

The proposed replacement and widened bridge will measure approximately 110 feet long by 57 feet wide that will meet and State and Federal roadway, bridge and seismic standards. The structure will utilize pre-stressed concrete planks with cast-in-place deck topping with separated bikeway/pedestrian walkways on both sides.

The proposed design includes two 12-foot travel lanes plus two 8.5-foot shoulders, two 5-foot pedestrian walkways/bicycle lanes, reinforced guardrails, and drainage features. The approach and trailing guardrails will comply with the current standards of the State Department of Transportation, Highways Division, Design Branch. Rip-rap or CRM will be installed on the banks of the stream beneath the bridge abutments to stabilize the embankment. The bridge and approach roads shall conform to AASHTO and SDOT-H design criteria for roadway widths and safety features.

The new ROW will be 63 feet, 4 inches wide. Acquisition of additional property is required to allow for waterlines to be supported on the outer edges of the new bridge. In all, four new drilled shafts will be constructed in the stream channel for the replacement bridge foundation. The existing concrete center wall pier will be removed.



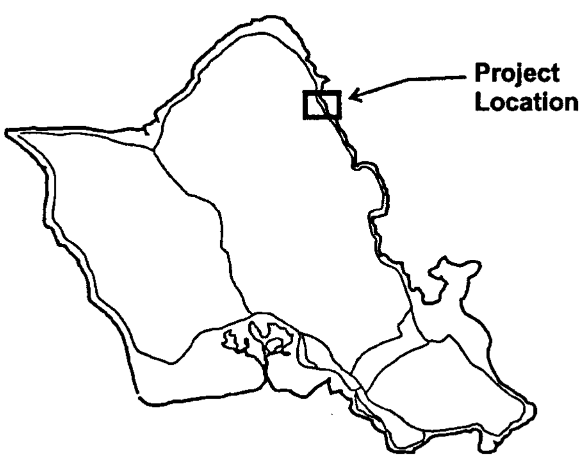


FIGURE 1
PROJECT LOCATION & VICINITY MAP
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

R. M. TOWILL CORPORATION

January 2006

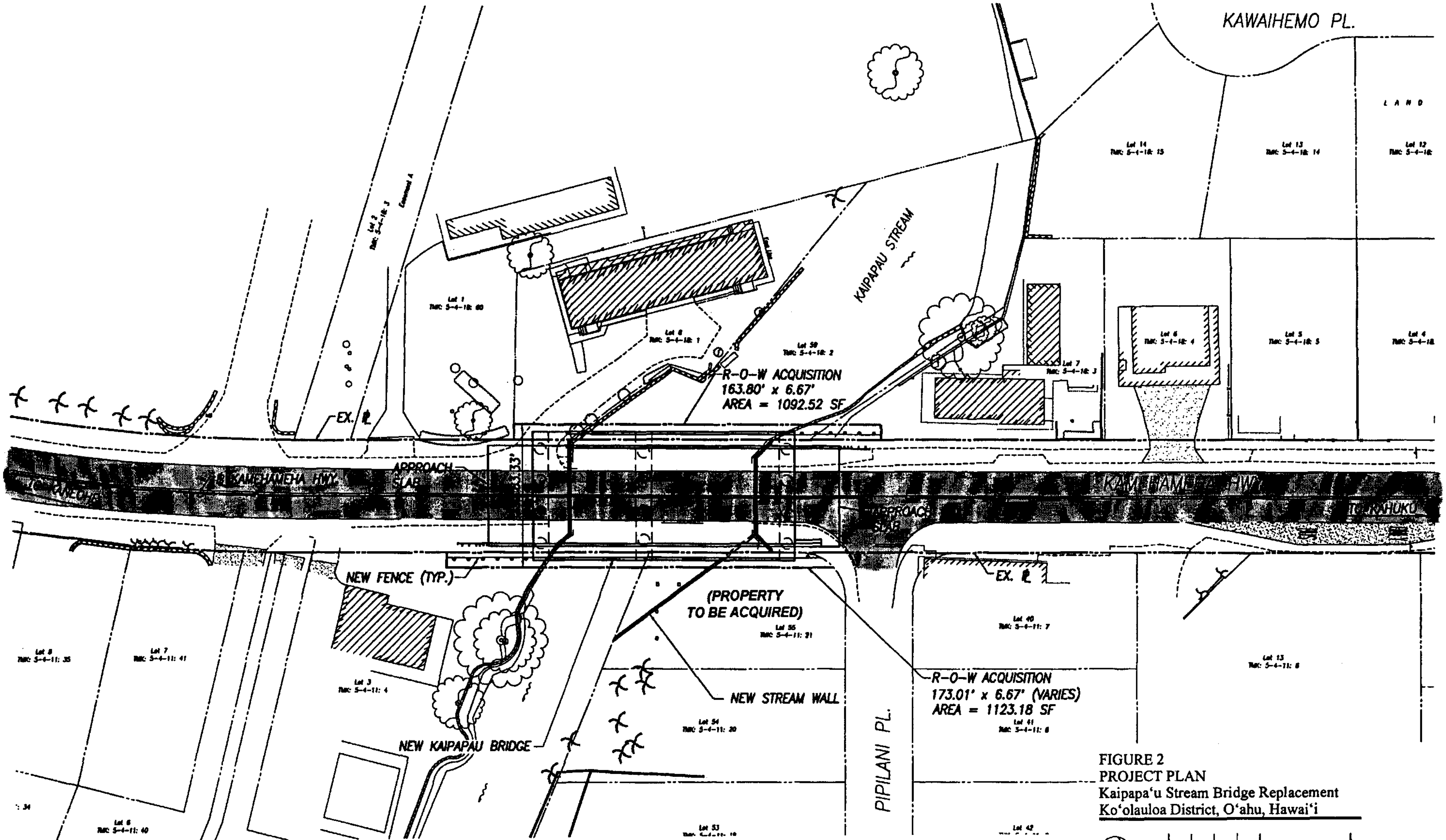


FIGURE 2
PROJECT PLAN
Kaipapa'u Stream Bridge Replacement
Ko'olauloa District, O'ahu, Hawai'i

0 40 Feet 80

R. M. TOWILL CORPORATION January 2006

Questions, comments and concerns:

1. Heath questioned if Council Chair Donovan Dela Cruz's office was assisting the village with their efforts and Warren reported that the legislation was being held in Council member Romy Cachola's committee. Heath questioned if they could help and write to the City and State.

2. Choon questioned how important is the Kahuku Golf Course is worth to the public. Chair Letts asked Ben Henderson if he would look into the State and see what was available for assistance since this was the only beach left with sand dunes.

3. Elkington commented on a petition that was signed by many of those who use the Kahuku Golf Course and passed around at the club house to save it and hoped that the community would find that petition and hopefully use to their benefit. Chair Letts commented that she will have the Planning and Land Use Committee look into this information and provide an update at the next Board meeting.

4. Resident commented that 5,000 houses will be built in the next 10 years and recreation areas will be needed.

Turtle Bay Update – Chair Letts shared the following information:

1. An email from Steven Doyle from Lauri Sunakoda from Corporation Counsel. This is regarding a question to DPP and if it would attend a public meeting for community input regarding the Kuilima resort, Corp Counsel reported that DPP declined a public meeting but welcomed written statements would be taken in for consideration. She also reported that Doyle expects an article soon in the Honolulu Advertiser and will give information as to where to send in statements for consideration.

2. Heath reported that several members of the Koolauloa Board had attended the Hawaii 2050 Task Force Kick off Conference on Sustainable Communities and listened to former Governor George Ariyoshi speak. The former Governor went ahead and spoke about working on plans from the 1970's for the future and upon review of these plans; the comment was that much of what he and his associates had not come to pass. Ariyoshi cautioned that past plans should be revisited and Heath stated that with the community and other leaders, it would be time for the community to revisit the past plans made for Turtle Bay.

3. Choon questioned what Doyle is trying to do when several Neighborhood Boards have taken stands at asking the City to revisit these plans. Choon stated that over 11,000 people through petition supported the revisiting of these plans and she is not sure what Doyle is trying to do with the information. Chair Letts commented that Doyle only wanted information to be given out and explained to the community. Choon questioned if Neighborhood Boards have any weight regarding this issue but Chair Letts commented that City Corporation Counsel stated the community has no say since City Council left the permits in question open ended with no time limits.

4. Dee dee Herron announced that October 25 at 5:00 p.m., the State Oahu Coalition will have a candle light vigil at Honolulu Hale, the same night that the City will be meeting to discuss the Turtle Bay issue. They hope to have 1,000 people attend the vigil.

Hauula Skate Park – update Chair Letts reported the following information: Meetings that have been called by Chair Dela Cruz' office has reported that there is no money ear marked for this project. The site selected was unsuitable and alternatives are going to Kokololio Beach Park and possible moves by the Hauula Beach Park. DPR is looking at the possibility of putting in a play court at the site initially set for the skate park as an alternative and will work with Chair Dela Cruz' office to have funds for that project released quickly.

NEW BUSINESS:

Kaipapau Bridge – R. M. Towill Walter Chong and Lee Taniguchi from DOT reported the following information. The Kaipapau stream bridge is located on Kamehameha Highway between Ikea loop and Pipilani place. At this time, the bridge does not meet State and Federal Standards with narrow one foot shoulders and substandard pedestrian walkways. With structural corrosion and serving beyond is service life (originally construct in 1932), the plan is to replace existing bridge with new bridge and do it in phases that will allow for sidewalks on both sides, new guard rails and end treatments. The impact of the project will delay traffic and have the temporary relocation of two households and the permanent relocation of one household that will have acquisition happen.

The project should start in March 2008 for 18 months with a proposed work hour of Monday-Friday 8:00 a.m. – 3:30 p.m. with no night or weekend work proposed. Press releases will be made along with residents in the immediate area being notified by the contractor.

Questions, comments and concerns:

1. Elkington questioned about the bridge on the other side of Hauula that is currently being worked on and asked if these will coincide. Chong reported that the project on Kaipapau Bridge will start after the completion of the Laie Bridge.

2. Hurlbut questioned if there would be bypasses put in but Chong stated it would have required more land to be acquisitioned.

3. Soh questioned the service life of the bridge and Chong reported it was 50 years. Soh also questioned the new width of the bridge versus the old bridge and Chong reported that the old bridge was only 28 feet wide while the new bridge will be 67 feet wide. His last question was if there were any penalties that will be added to the construction company in order to deter lane closures and finishing late periods and Chong reported that this could be put into the project contract.

4. Kaluhiokalani asked why the home on the makai side of Kamehameha Highway will be demolished if there are no bypasses being made. Chong stated that the home is very close to the original bridge and because of the expansion; the home would less then 10 feet away from the bridge. Chong also commented that they would need to remove the home in order to do construction on the bridge and to allow for access for the channel for maintenance purposes.

5. Macy commented that parents who drive their children to school would be stuck in construction traffic. Chair Letts commented that they can give a suggestion to DOT that the contractor be aware of this and schedule accordingly.

6. Albert commented that the school buses would be trapped by this traffic. School buses pick up Elementary School children and return back to Kahuku High School. The construction traffic would trap kids who are waiting for the school bus that is stuck in traffic. Chong reported that there will be lanes opened going both ways except for several periods where there will be a contra flow lane that is slated to be in the middle of the day. Chair Letts commented that it should be brought to the contractor's attention to schedule the periods of lane closures around the school bus hours to ensure that children are not trapped in traffic on the buses.

   Heath reiterated that the contractors should understand the human consideration of children being trapped on school buses. Chong reported that he would look into the contract and possibly have the contractor face fines if they are over their time limits each day.

7. Soh questioned what land was presently owned by DOT and Chong reported that 50 feet was owned but the expansion with clear that width and the land acquisition is what is required. An additional 13 feet would be needed in order.

Proposed wind farm for Kahuku- Westwind Works (Keith Avery)

Avery reported on the proposed wind farm in Kahuku will be a $100 project. The West Wind Works LLC would like to inform the community of their project and will not further the project without Board and community approval. The land that will be used is Agriculture zoned land 1 & 2 and is located makai and mauka of Kamehameha Highway near the Turtle Bay resort. The wind mills are approximately 300 feet tall with 90 feet wide rotators that will generate 2 ½ megawatts per day with 50 megawatts per day. The turbines that will be used are relatively quiet and have a better technology behind them in order to produce more energy and can be substantiated by similar projects already on the neighbor island that Avery had worked on. The ground area needed for the project would approximately 18 square feet and hope that the land below the wind mills will be used by agriculture farmers. A clip was shown of the three rotator wind mills Avery is proposing. Avery commented on programs that are environmentally based to ensure that the affect of the wind mills is limited.

Chair Letts took the meeting out of order to allow for questioning of Walter Chong on Kaipapau Bridge.

Questions, comments and concerns:

1. Hurlbut asked about the acquisition of the property on the makai side of Kamehameha Highway and if the property owner was aware. Chong reported that they have been in contact with the owner and they will buyout and assist in a move of the household. The temporary relocation of people will provide for a stipend that is mandated by federal guidelines.

2. Heath questioned if there was an Environmental assessment draft available and Chong stated that there was. She then asked that he provide the Board with two copies for their review.

3. Mattoon recommended that before construction begins a blessing happen for the bridge replacement and ensures that works, drivers, and all others in the area stay safe.

Questions, comments and concerns:

1. Kaluahiolani tax revenue/jobs. Tax breaks in Maui Maui paying tax, will have information at the Next Board meeting. Dedicated fund to fish and wildlife, especially the protection of the Hawaiian Stilt and bringing the Hawaiian Booby. Fuel is free at a fixed price for eternity.

2. Elkington questioned the experimental wind mills during the 1980's and 1990's and asked if the present were economically efficient. HECO's wind mill project in 1987 used Westinghouse turbines which were not made for to generate wind energy. Today, the turbines being used are a far more reliable technology.

3. Heath questioned if Avery was in contact with the developers of the Turtle Bay resort and what they had to say. Avery commented that the developers did not want to discuss the issue because if visitors believed it was windy, no one would come.

4. Soh asked about the 3 blades on the wind mills and what noise affect it would have. Avery stated that people could stand right under the wind mills and have a discussion without too much disturbance since they move fairly slowly.

5. Chair Letts asked how many wind mills Avery expects to install and has he reviewed the view plane study for the area. Avery reported that he would have 10 mauka and 10 makai of Kamehameha Highway.

A motion by and seconded by Heath was passed to postpone committee reports until next Board meeting.

COMMITTEE REPORTS: Postponed until next Board meeting.

ANNOUNCEMENTS:

ADJOURNMENT: The meeting adjourned at 9:07 p.m.

Submitted by:

Vanessa Matautia
Neighborhood Commission Office

C.
Draft EA
Consultation

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

RECEIVED
DEC - 6 2006
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DD

MUFI HANNEMANN, Mayor

RANDALL Y. S. CHUNG, Chairman
HERBERT S. K. KAOPUA, SR.
SAMUEL T. HATA
ALLY J. PARK
ROBERT K. CUNDIFF
RODNEY K. HARAGA, Ex-Officio
LAVERNE T. HIGA, Ex-Officio

CLIFFORD P. LUM
Manager and Chief Engineer

December 1, 2006

Mr. Duane Taniguchi
State of Hawaii
Department of Transportation
Highways Division
601 Kamokila Boulevard, Room 609
Kapolei, Hawaii 96707

Dear Mr. Taniguchi:

Subject: Your Letter Regarding the Draft Environmental Assessment for the Kaipapa'u Stream Bridge Replacement

Thank you for the opportunity to comment on the proposed project.

The Board of Water Supply has two water mains in the vicinity of the Kaipapa'u Bridge (12-inch and 16-inch). Construction drawings for the bridge replacement should be submitted for our review and approval.

If you have any questions, please contact Robert Chun at 748-5440.

Very truly yours,

K. Shida

KEITH S. SHIDA
Principal Executive
Customer Care Division

cc: Mr. Chester Koga, R.M. Towill Corporation
Office of Environmental Quality Control

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3435

FEB 6 2007

Mr. Keith S. Shida
Principal Executive
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Shida:

Subject: Draft Environmental Assessment Comments for
Proposed Kamehameha Highway, Kaipapau Stream Bridge Replacement
Federal-Aid Project No. BR-083-1(48)

Thank you for your comment letter of December 1, 2006, on the subject project. The State of Hawaii Department of Transportation (HDOT) offers the following response to your comment on the Draft Environmental (EA):

1. You are concerned about the two Board of Water Supply water mains along Kamehameha Highway in the vicinity of subject bridge. As stated in Section 6.2 of the Draft EA, HDOT will coordinate with BWS to minimize service disruptions. We will add clarifying language in the EA to note that construction drawings will be submitted to BWS for approval.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3435 as noted above.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Deputy Director-Highways

c: Federal Highway Administration (Eric Worrell)
R. M. Towill (Walter Chong)

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
DEC 11 2006
DEPARTMENT OF TRANSPORTATION
HIGHWAY DD

PETER T. YOUNG
CHAIRPERSON

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JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
LAWRENCE H. MIIKE, M.D., J.D.
STEPHANIE A. WHALEN

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR

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

December 7, 2006

REF:

Mr. Duane Taniguchi
Department of Transportation
Highways Division
601 Kamokila Boulevard, Room 609
Kapolei, Hawaii 96707

Dear Mr. Taniguchi:

SUBJECT: Draft Environmental Assessment for the Kaipapau Stream Bridge Replacement, Federal Aid Project No. BR-083-1(48)

FILE NO.: N/A

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at *http://www.hawaii.gov/dlnr/cwrm.*

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☒ 3. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM: Additional information and forms are available at *www.hawaii.gov/dlnr/cwrm/forms.htm.*

☐ 4. The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.

☐ 5. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

☐ 6. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 7. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 8. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☒ 9. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.

☐ 10. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 11. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 12. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☐ 13. We recommend that the report identify feasible alternative non-potable water resources, including reclaimed wastewater.

☒ OTHER:

Chapter 7, Section 7.5.7 (p. 84)
The acronym for the Commission on Water Resource Management should be "CWRM", instead of "CRM". The title of Hawaii Administrative Rules Title 13, Subtitle 7, Chapter 169, should read, "Protection of <u>Instream</u> [Instead] Uses of Water."

Chapter 9, Section 9.2 (p. 93)
Please include the Commission on Water Resource Management under the list of State Agencies consulted or to be consulted during preparation of the Draft EA.

If there are any questions, please contact Ed Sakoda at 587-0234.

Sincerely,

DEAN A. NAKANO
Acting Deputy Director

cc: Office of Environmental QualityControl
Mr. Chester Koga, R.M. Towill Corporation

LINDA LINGLE
GOVERNOR

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

HWY-DD 2.3442

FEB 6 2007

TO: DEAN A. NAKANO, ACTING DEPUTY DIRECTOR
COMMISSION ON WATER RESOURCE MANAGEMENT
DEPARTMENT OF LAND AND NATURAL RESOURCES

FROM: BRENNON T. MORIOKA, Ph.D., P.E.
DEPUTY DIRECTOR-HIGHWAYS

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT COMMENTS FOR PROPOSED KAMEHAMEHA HIGHWAY, KAIPAPAU STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48)

Thank you for your comment letter of December 7, 2006, on the subject project. The State of Hawaii Department of Transportation (HDOT) offers the following response to your comments on the Draft Environmental Assessment (EA):

1. There may be a potential for ground or surface water degradation and that the subject project be reviewed by the Department of Health (DOH). The DOH has been consulted on the subject project and the construction contractor will be advised of his responsibility to maintain water quality.

2. A Stream Channel Alteration Permit is required. We are aware of this requirement and will be submitting our application shortly.

3. Acronym for the Commission on Water Resource Management. We will correct the citations in the Final EA.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3442 as noted above.

c: Federal Highway Administration (Eric Worrell)
R. M. Towill(Walter Chong)

LINDA LINGLE
GOVERNOR

RECEIVED
NOV 28 2006
DEPARTMENT OF TRANSPORTATION
HIGHWAY-DD

RUSS K. SAITO
COMPTROLLER

KATHERINE H. THOMASON
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

'06 NOV 27 A10:42 DEPT OF TRANSPORTATION

2006 NOV 24 A 9:54

(P1288.6

NOV 22 2006

MEMORANDUM

TO: Mr. Glenn M. Yasui, Administrator
Division of Highways
Department of Transportation

ATTENTION: Mr. Duane Taniguchi

FROM: Ernest Y. W. Lau
Public Works Administrator

SUBJECT: Kaipapau Stream Bridge Replacement, Hauula, Oahu
Federal Aid Project No. BR-083-1(48)

Thank you for the opportunity to provide comments to the subject project's Draft Environmental Assessment. This project does not directly impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If you have any questions, please have your staff call Mr. Bruce Bennett of the Planning Branch at 586-0491.

BB:vca

c: Ms. Genevieve Salmonson, DOH-OEQC
Mr. Chester Koga, R.M. Towill Corporation

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3440

FEB 6 2007

TO: ERNEST Y. W. LAU, ADMINISTRATOR
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

FROM: BRENNON T. MORIOKA, Ph.D., P.E.
DEPUTY DIRECTOR-HIGHWAYS

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT COMMENTS FOR PROPOSED KAMEHAMEHA HIGHWAY, KAIPAPAU STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48)

Thank you for your comment letter of November 22, 2006, on the subject project, noting that the project does not directly impact project(s) or facilities of your Department.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3440 as noted above.

c: Federal Highway Administration (Eric Worrell)
R. M. Towill(Walter Chong)

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 523-4564 • Fax: (808) 523-4567
Web site: www.honolulu.gov

MUFI HANNEMANN
MAYOR

EUGENE C. LEE, P.E.
DIRECTOR

CRAIG I. NISHIMURA, P.E.
DEPUTY DIRECTOR

RECEIVED
DEC - 6 2006
DEPARTMENT OF TRANSPORTATION
HIGHWAY CO

December 4, 2006

Mr. Duane Taniguchi
Department of Transportation,
Highways Division
601 Kamokila Boulevard, Room 609
Kapolei, Hawaii 96707

Dear Mr. Taniguchi:

Subject: Draft Environmental Assessment
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)
Oahu, Koolauloa
TMK: Roadway right-of-way adjacent to Plats (1) 5-4-011 and 018

Thank you for giving us the opportunity to comment on the above Draft Environmental Assessment (DEA).

The Department of Design and Construction has the following comment:

- The project shall comply with FEMA's "No Rise" requirement and it should be stated as such in the DEA.

Should you have any questions, please call Marvin Char, chief of our Civil Division, at 527-6381.

Very truly yours,

Eugene C. Lee, P.E.
Director

ECL:lt (181656)

c: R. M. Towill Corporation
DDC Civil Division

LINDA LINGLE
GOVERNOR

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

HWY-DD 2.3436

FEB 6 2007

Mr. Eugene C. Lee, P.E., Director
Department of Design and Construction
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lee:

Subject: Draft Environmental Assessment Comments for
Proposed Kamehameha Highway, Kaipapau Stream Bridge Replacement
Federal-Aid Project No. BR-083-1(48)

Thank you for your comment letter of December 4, 2006, on the subject project. The State of Hawaii Department of Transportation (HDOT) offers the following response to your comment on the Draft Environmental Assessment (EA):

1. You noted that the project should comply with the Federal Emergency Management Agency's "no rise" requirement. The Final EA will be clarified to include this requirement.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3436 as noted above.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Deputy Director-Highways

c: Federal Highway Administration (Eric Worrell)
R. M. Towill (Walter Chong)

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

RECEIVED
DEPARTMENT OF TRANSPORTATION
HIGHWAY DO

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

November 17, 2006

To: Brennon T. Morioka, Deputy Director
Department of Transportation, Highways Division

Attention: Duane Taniguchi

From: Micah A. Kane, Chairman
for Hawaiian Homes Commission Darrell Yagodich

Subject: Draft Environmental Assessment Report the Kaipapa'u Stream Bridge Replacement Project

Thank you for the opportunity to provide comments on the draft Environmental Assessment report for the Kaipapa'u Stream Bridge Replacement project along Kamehameha Highway near Hau'ula, Oahu. The Department of Hawaiian Home Lands has no comments to offer.

Should you have any questions, please call the Planning Office at 586-3836.

c: OEQC
R.M. Towill Corporation

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3438

FEB 6 2007

TO: MICAH A. KANE, CHAIRMAN
DEPARTMENT OF HAWAIIAN HOME LANDS

FROM: BRENNON T. MORIOKA, Ph.D., P.E.
DEPUTY DIRECTOR-HIGHWAYS

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT COMMENTS FOR PROPOSED KAMEHAMEHA HIGHWAY, KAIPAPAU STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48)

Thank you for your comment letter of December 1, 2006, on the subject project, noting that your Department has no comments to offer on the subject project.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3438 as noted above.

c: Federal Highway Administration (Eric Worrell)
R. M. Towill (Walter Chong)

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EPO-06-192

December 7, 2006

Mr. Duane Taniguchi
State of Hawaii
Department of Transportation
Highways Division
601 Kamokila Boulevard, Room 609
Kapolei, Hawaii 96707

Dear Mr. Taniguchi:

SUBJECT: Draft Environmental Assessment for Kaipapau Stream Bridge Replacement for State Route 83, Kamehameha Highway, Koolauloa, Oahu, Hawaii Adjacent to Plats (1) 5-4-011 and (1) 5-4-018

Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have no comments at this time. We strongly recommend that you review all of the Standard Comments on our website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this project should be adhered to.

If there are any questions about these comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

KELVIN H. SUNADA, MANAGER
Environmental Planning Office

c: EPO
Mr. Chester Koga, R.M. Towill Corporation

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3443

FEB 6 2007

TO: KELVIN H. SUNADA, MANAGER
ENVIRONMENTAL PLANNING OFFICE
DEPARTMENT OF HEALTH

FROM: BRENNON T. MORIOKA, Ph.D., P.E.
DEPUTY DIRECTOR-HIGHWAYS

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT COMMENTS FOR PROPOSED KAMEHAMEHA HIGHWAY, KAIPAPAU STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48)

Thank you for your comment letter of December 7, 2006, on the subject project, noting that your Department has no comments to offer on the subject project at this time.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3443 as noted above.

c: Federal Highway Administration (Eric Worrell)
R. M. Towill(Walter Chong)

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4432 • FAX: (808) 527-6743
DEPT. INTERNET: www.honoluludpp.org • INTERNET: www.honolulu.gov

MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

RECEIVED
NOV 24 2006
DEPARTMENT OF TRANSPORTATION
HIGHWAY-DD

2006/ELOG-2802(pd)

November 22, 2006

Mr. Duane Taniguchi
Department of Transportation - Highways Division
State of Hawaii
601 Kamokila Boulevard, Room 609
Kapolei, Hawaii 96707

Subject: Comments on Draft Environmental Assessment (DEA)
Kaipapau Stream Bridge Replacement
Tax Plats 5-4-11 and 5-4-18

Thank you for the opportunity to review the above Draft Environmental Assessment (DEA). The proposal involves demolition of the existing bridge over Kaipapau Stream, and construction of a replacement bridge that will conform to current seismic/structural requirements.

We note that a Special Management Area Use Permit (SMP) is not required for work within the 50-foot wide highway right-of way. However, according to the DEA, the preferred alternative (i.e., Alternative No. 4) will involve two (2) right-of-way acquisitions as well as work within the Kaipapau Stream, including a new stream wall. Thus, an SMP is required. The following should be addressed:

- What terrestrial animals are found within the project site? Have any federally-listed endangered species been found on-site or nearby (including Koloa, Hawaiian Coot, Hawaiian Gallinule, and Hawaiian Stilt, for example)?

- The DEA discloses that four (4) new drilled shafts will be constructed within the stream channel for the new bridge foundation, to depths of between 30 - 50 feet. Will there be borings into bedrock? If so, give specific information on depth, etc., and any anticipated impact and mitigation measures of these activities on the stream and native species.

- Will fill material be required? If so, how much? Where is it to be placed? What steps will be taken to ensure that it is clean and free of alien plants or parasites to which native species are susceptible?

- The DEA states that dewatering activities are anticipated during installation of the drilled shafts within the stream channel. Will there be a settling tank, sedimentation pond, and hydro-testing containment treatment pond? If so, provide specifications, and indicate where they will be located. (In addition to a written description, a map showing where these activities will take place should be included.)

- The DEA states that "the subject property may also serve as staging and stockpiling areas for construction equipment." It also states, "In-stream activity includes (...) staging and maneuvering of heavy equipment." Please explain, and indicate where activities will take place on the site plan. In addition, show the location of the sediment retention berms. (We note that the community generally expresses interest in staging/stockpiling issues, and finds them important.)

- The DEA states that, "Any site designated for re-fueling shall be located away from the stream, enclosed by a containment berm and constructed to contain spills and seepage and prevent storm water runoff from carrying pollutants into state coastal waters." As noted above, please provide information on the location of the proposed activity, and show it on the site plan.

- Will grading occur within the stream? If so, where?

- If excavation is required to accommodate the new abutments, what will happen to the excavated material? Will it be stockpiled on-site, and if so, where? Or, will it be disposed of off-site?

- Will existing bridge abutments be cut off at the mud-line, or entirely removed?

- During demolition and new concrete work, what steps will be taken to contain debris?

- Will oil boom floats be used to extract petroleum and any hydraulic fluid which may be released? Provide specific information.

- Will additional stream bank hardening be required? If so, where?

- Will any stream widening be required? If so, where?

- The DEA notes that there are buried water lines, but does not address their precise location. The 12- and 16-inch lines (existing, temporary and permanent) should be shown on the site plan. In addition, please address all potential impacts and proposed mitigation measures pertaining to this work.

- Will existing overhead electrical, telephone and cable lines remain in place during construction?

- Will temporary street lighting be required? If so, where will it be located? If temporary lighting is utilized, will permanent lighting be returned to its original location?

- Provide a proposed landscape plan for post-construction revegetation, including number, species, and height/gallon size of all plant materials.

- Under the section entitled "Other Permits and Approvals", it should be noted that building permits and a "no rise certification" will be required. Also, if grading is to occur, grading permits may be required.

Should you have any questions, please contact Pamela Davis of our staff at 523-4807.

Very truly yours,

FOR ~~Henry Eng, FAICP, Director~~
Department of Planning and Permitting

HE:cs

cc: Office of Environmental Quality Control
R. M. Towill Corporation

Doc496722

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3441

FEB 6 2007

Mr. Henry Eng, Director
City and County of Honolulu
Department of Planning and Permitting
650 South Beretania Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. Eng:

Subject: Draft Environmental Assessment Comments for
Proposed Kamehameha Highway, Kaipapau Stream Bridge Replacement
Federal-Aid Project No. BR-083-1(48)

Thank you for your comment letter of November 22, 2006, on the subject project. The State of Hawaii Department of Transportation (HDOT) offers the following response to your comments on the Draft Environmental Assessment (EA):

1. Are there and what types of terrestrial animals are found at the project site? We have not observed any endangered species at or near the project site. As noted in the Draft EA, however, common birds were observed.

2. Will there be boring into bedrock? As stated in the Draft EA, four new shafts will be drilled for new supports for the bridge. The shafts will be placed in the stream and will be dug to a depth of approximately 30 feet or until bedrock is encountered. The proposed drilling will be first attempted from the existing bridge or stream bank to minimize impacts to the stream. Further, the stream will be temporarily diverted to one side of the steam in order that work can be done away from the flowing stream. The construction contractor will be instructed to minimize discharges into the stream.

3. Will fill material be required? "Fill" will be required for the project in two areas: a) bridge abutments will be constructed at both ends of the stream to support the bridge decks and b) the support shafts will be installed in the stream. We will minimize impacts to the stream by creating "dry" conditions as construction of the two elements proceeds. The diversion of the stream to one-side is currently our preferred method of diverting the stream flow. The fill material will be concrete for the abutments and the backfill material will be imported gravel and rock and soil removed from the site.

4. Dewatering activities? Dewatering activities are anticipated when the support shafts are dug. The effluent from the holes (about 18 inches in diameter) will be pumped to a filtering system on the banks. The filtering system will use a combination of filter fabric and sand. The filtered water will be returned to the stream. Two parcels of land have been selected for staging of equipment and material and we will identify these sites in the Final EA. Specific methods and means will be left to the construction contractor.

5. Will grading occur in the stream? No grading is anticipated.

6. Excavation requirements and disposal of soils? Excavation is anticipated during the installation of the bridge abutments. The exact quantity has not been determined at this time. It is anticipated that the excavated soil and rocks, if not re-used as fill, will be disposed by the construction contractor at a landfill approved for such material. If the excavated material will be re-used on site, one of the two sites identified earlier will be the designated stockpile location.

7. Will the existing bridge abutments be cut off at the mud line? If the existing abutment will be removed, then they will be cut off at the mud line.

8. What steps will be used to contain debris? Construction debris will be contained in several ways that include: a) installation of low silt and debris fences to contain construction material within the work area, b) 6-8 feet dust fences, c) trap screens under the bridge to prevent material from entering the stream, and d) general house-keeping to keep the work area free of flying debris, trash and other loose objects.

9. Will oil boom floats be used to extract petroleum and any hydraulic fluid that may be released? The construction contractor will be instructed not to perform any fueling activities on the bridge or in the stream. The contractor will be required to have a contingency plan in the event of a petroleum spill.

10. Will additional stream bank hardening be required? No other stream hardening is proposed other than the wing-walls currently proposed before and after the bridge. A portion of the downstream wall will be extended to protect a home from storm flows.

11. Will any stream widening be required? No widening is currently anticipated.

12. Location of buried waterlines? We will show the location of the waterlines in the Final EA and address potential impact resulting from the replacement of the waterlines at the bridge.

13. Will existing overhead electric, telephone and cable lines remain in-place during construction? Relocation of power, telephone and cable lines are anticipated and will occur at the time of construction.

14. Will temporary street lighting be required? No additional street lighting is currently planned.

15. Provide a proposed landscape plan for post-construction Revegetation? No additional landscaping is currently proposed, other than grassing of the staging areas.

16. Other Permits? We will note that a "no rise certification" is required or a Conditional Letter of Map Revisions will be filed with the Federal Emergency Management Agency.

We acknowledge that a Special Management Area Permit is required for the subject project.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3441 as noted above.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Deputy Director-Highways

c: Federal Highway Administration (Eric Worrell)
R. M. Towill(Walter Chong)

HONOLULU FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
636 SOUTH STREET • HONOLULU, HAWAII 96813
TELEPHONE: (808) 723-7139 • FAX: (808) 723-7111 • INTERNET: www.honolulufire.org

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ALVIN K. TOMITA
DEPUTY FIRE CHIEF

RECEIVED

December 4, 2006

Mr. Duane Taniguchi, Project Engineer
Highways Division
Department of Transportation
State of Hawaii
601 Kamokila Boulevard, Room 609
Kapolei, Hawaii 96707

Dear Mr. Taniguchi:

Subject: Draft Environmental Assessment
Kaipapa'u Stream Bridge Replacement
Federal Aid Project Number BR-083-1(48)
Tax Map Key: Roadway Right-of-Way Adjacent to Plats (1) 5-4-011 and 018

In response to a letter from Mr. Chester Koga of R.M. Towill Corporation regarding the above-mentioned subject, the Honolulu Fire Department reviewed the material provided and has no objections to the proposed project.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 723-7151.

KENNETH G. SILVA
Fire Chief

KGS/KT:jl

cc: Office of Environmental Quality Control
Mr. Chester Koga, R.M. Towill Corporation

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3433

FEB 6 2007

Mr. Kenneth G. Silva
Fire Chief
Honolulu Fire Department
636 South King Street
Honolulu, Hawaii 96813-5007

Dear Chief Silva:

Subject: Draft Environmental Assessment Comments for Proposed Kamehameha Highway, Kaipapau Stream Bridge Replacement Federal-Aid Project No. BR-083-1(48)

Thank you for your comment letter of December 4, 2006, on the subject project noting that the Fire Department has no objections to the project.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3433 as noted above.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Deputy Director-Highways

c: Federal Highway Administration (Eric Worrell)
R. M. Towill (Walter Chong)

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

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DEC - 4 2006
DEPARTMENT OF TRANSPORTATION
HIGHWAY-DD

MUFI HANNEMANN
MAYOR

BOISSE P. CORREA
CHIEF

GLEN R. KAJIYAMA
PAUL D. PUTZULU
DEPUTY CHIEFS

OUR REFERENCE BS-DK

November 28, 2006

Mr. Duane Taniguchi
Highways Division
Department of Transportation
601 Kamokila Boulevard, Room 609
Kapolei, Hawaii 96707

Dear Mr. Taniguchi:

This is in response to the R. M. Towill Corporation's letter regarding a Draft Environmental Assessment for the Kaipapa`u Stream Bridge Replacement project in Ko`olauloa.

This project should have no unanticipated impact on the facilities or operations of the Honolulu Police Department.

If there are any questions, please call Major Janna Mizuo of District 4 at 247-2166 or Mr. Brandon Stone of the Executive Office at 529-3644.

Sincerely,

BOISSE P. CORREA
Chief of Police

By

JOHN P. KERR
Assistant Chief of Police
Support Services Bureau

cc: OEQC
Mr. Chester Koga, R. M. Towill Corporation

LINDA LINGLE
GOVERNOR

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

HWY-DD 2.3439

FEB 6 2007

Mr. Boisse P. Correa
Police Chief
Honolulu Police Department
801 South Beretania Street
Honolulu, Hawaii 96813

Dear Chief Correa:

Subject: Draft Environmental Assessment Comments for
Proposed Kamehameha Highway, Kaipapau Stream Bridge Replacement
Federal-Aid Project No. BR-083-1(48)

Thank you for your comment letter of November 28, 2006, on the subject project, noting that the project should have no impacts on facilities operations of the Honolulu Police Department.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3439 as noted above.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Deputy Director-Highways

c: Federal Highway Administration (Eric Worrell)
R. M. Towill(Walter Chong)

September 4, 2006

Mr. Duane Taniguchi
Department of Transportation
Highways Division
601 Kamokila Boulevard, Room 609
Kapolei, HI 96707

Dear Mr. Taniguchi,

Chester Koga of R.M. Towill Corporation has kindly provided us with an advance copy of the Preliminary Draft Environmental Assessment (EA) relating to the Kaipapa'u Stream Bridge Replacement, Project No. BR-083-1(48) and has requested that we direct any comments to you.

We are the owners of TMK: 5-4-11: 20, shown as Lot 54 on the various figures in the EA, and are concerned about the effects that construction may have on our property. We note, specifically, that the project will involve construction of "drainage features." (Project Summary, p. 1). Drainage features apparently include "slope protection (rip-rap or CRM) at the abutment walls" (Section 2.6.2, [preferred] Alternative 4, Phase 1, p. 12) and a "new stream wall" (Figure 2, Alternative 4, Site Plan).

It appears to us that these features to be constructed will force very large amounts of runoff into our property during even moderate rains since our property is the only one in the area which retains its natural terrain and has not been protected by (illegally?) constructed walls along Kaipapa'u Stream. We would therefore like to meet with you or your representative to discuss this situation further. Please advise us when you could schedule such a meeting.

Thank you for your consideration in this matter.

Sincerely,

Bruce & Sandra Nicholl
47-365 Lulani St.,
Kaneohe, HI 96744
239-6171
Nichollb@aol.com

cc: Rodney Haraga, Director
State of Hawaii Department of Transportation

Chester Koga
Planning Project Coordinator
R.M. Towill Corporation

LINDA LINGLE
GOVERNOR

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

HWY-DD 2.3434

FEB 6 2007

Bruce and Sandra Nichol
47-365 Laulani Street
Kaneohe, Hawaii 96744

Dear Bruce and Sandra Nichol:

Subject: Draft Environmental Assessment Comments for
Proposed Kamehameha Highway, Kaipapau Stream Bridge Replacement
Federal-Aid Project No. BR-083-1(48)

Thank you for your comment letter of September 4, 2006, on the subject project. The State of Hawaii Department of Transportation (HDOT) offers the following response to your comment on the Draft Environmental Assessment (EA):

1. You are concerned that the proposed rip rap to be installed will impact your property. This matter is currently under further study and you will be contacted as we make our final decision.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3434 as noted above.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Deputy Director-Highways

c: Federal Highway Administration (Eric Worrell)
R. M. Towill (Walter Chong)

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

November 20, 2006

Mr. Rodney K. Haraga, Director
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawai'i 96813

Dear Mr. Haraga:

Subject: Draft EA for the Kaipapau Stream Bridge Replacement

Thank you for the opportunity to review the subject document. We have the following comment.

1. Please print on both sides of the pages in the final document to reduce bulk and save on paper. HRS 342G-44 requires double-sided copying in all state and county agencies, offices and facilities.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson

Genevieve Salmonson
Director

c: R.M Towill

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3437

FEB 6 2007

TO: GENEVIEVE K. Y. SALMONSON, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: BRENNON T. MORIOKA, Ph.D., P.E.
DEPUTY DIRECTOR-HIGHWAYS

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT COMMENTS FOR PROPOSED KAMEHAMEHA HIGHWAY, KAIPAPAU STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48)

Thank you for your comment letter of November 20, 2006, on the subject project. The State of Hawaii Department of Transportation (HDOT) offers the following response to your comment on the Draft Environmental Assessment (EA):

1. You requested that the Final EA be printed on both sides of the page. The HDOT will comply with your request.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3437 as noted above.

c: Federal Highway Administration (Eric Worrell)
R. M. Towill(Walter Chong)

PHONE (808) 594-1888 FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

RECEIVED
DEC 13 2006
DEPARTMENT OF TRANSPORTATION

HRD06/2272B

December 4, 2006

Duane Taniguchi
Department of Transportation- Highways Division
601 Kamokila Blvd., Room 609
Kapolei, HI 96707

RE: Draft Environmental Assessment for the Proposed Replacement of the Kaipapa'u Stream Bridge, Hau'ula, O'ahu, TMK (1) 5-4-011 and 018.

Dear Mr. Taniguchi,

The Office of Hawaiian Affairs (OHA) is in receipt of your November 4, 2006 submission and offers the following comments:

Please see the attached comments to Mr. Brennan Morioka (HRD06/2272), dated March 7, 2006, as our concerns are stated within. Our staff has additional comments regarding how the Draft Environmental Assessment fulfilled OHA's comments which were drafted pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended.

1) Page 62 of the Draft Environmental Assessment says "See Appendix A, Archaeological Site Assessment and Cultural Impact Assessment." Our staff can not locate either of these documents in Appendix A. Please insert the aforementioned studies and resubmit the Draft Environmental Assessment to our office for review. Page 63 of the Draft Environmental Assessment states that a complete surface survey was completed "in, around and under the bridge." Where is the document that substantiates this claim? A "Traditional Cultural Practices Assessment" included in Appendix A may suffice as a type of Cultural Impact Assessment under NHPA, but it will not suffice as an Archaeological Inventory Survey.
2) Page 62 of the Draft Environmental Assessment states "To ensure that no subsurface cultural features will be destroyed during project construction, work within the project area will be monitored by the project contractor." The only way to steer clear of damaging historic properties is to 1) locate them and 2) avoid them. Archaeological monitoring does not, and has never, precluded the destruction of historic properties and/or burials. Therefore, OHA does not concur with the proposed mitigation measure.

3) As our staff requested in our March 7, 2006 comment letter to Mr. Morioka, we urge the applicant to complete a subsurface testing effort to identify potential historic properties prior to the commencement of construction related activities. Not only would this type of study take relatively little time and effort, but it is the only proper way to identify subsurface resources. Recovery during archaeological monitoring is a salvage effort at best and is not an appropriate form of protection for our kūpuna iwi. This request is in direct response to the applicants claim (P. 60, *Burial Sites*) that "Jaucas sands likely to contain burials are likely to exist within or near the present project area."

OHA urges that, in accordance with Section 6E-46.6, Hawaii Revised Statutes and Chapter 13-300, Hawaii Administrative Rules, if the project moves forward, and if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division (SHPD/DLNR) shall be contacted.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck, Native Rights Policy Advocate, at (808) 594-0239 or jessey@oha.org.

Aloha,

Clyde W. Nāmu'o
Administrator

C: Chester Koga, AICP
R.M. Towill Corporation
420 Waiakamilo Road # 411
Honolulu, HI 96817

Genevieve Salmonson
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

PHONE (808) 594-1888

FAX (808) 594-1865

COPY

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD06/2272

March 7, 2006

Brennon T. Morioka
State of Hawaii, Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

RE: Section 106 Consultation for the Proposed Replacement of Kaipapau Stream Bridge, Hau'ula, O'ahu.

Dear Mr. Morioka,

The Office of Hawaiian Affairs (OHA) is in receipt of your February 8, 2006 request for comment on the above listed proposed project. OHA offers the following comments:

Our staff recommends that the applicant contact Roland "Ahi" Logan and Cathleen Mattoon as part of your consultation effort. Both individuals are from the area and are intimately involved in the cultural preservation of Ko'olauloa.

As a general note, OHA is concerned with the proposed project's potential effects on historic properties and human burials. Our records show that a substantial amount of iwi was encountered during a utility improvement in Hau'ula, along Kamehameha Highway, during the mid-1990s. This is in addition to the overall regional issue of disturbing iwi during ground-altering activities: 65 sets of human remains were unearthed during a recent Board of Water Supply water main replacement project in nearby Punalu'u. It is with this in mind that OHA asks the applicant to complete a subsurface testing effort, as part of an Archaeological Inventory Survey, prior to earth-disturbing activities. The results of the survey can help the applicant in considering building alternatives that satisfy engineering requirements as well as offer protection to Hawai'i's cultural resources.

OHA also asks that, In accordance with Section 6E-46.6, Hawaii Revised Statutes and Chapter 13-300, Hawaii Administrative Rules, if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division (SHPD/DLNR) shall be contacted.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck, Native Rights Policy Advocate, at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

LINDA LINGLE
GOVERNOR

BARRY FUKUNAGA
INTERIM DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

HWY-DD 2.3444

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

FEB 6 2007

TO: CLYDE W. NAMUO, ADMINISTRATOR
OFFICE OF HAWAIIAN AFFAIRS

FROM: BRENNON T. MORIOKA, Ph.D., P.E.
DEPUTY DIRECTOR-HIGHWAYS

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT COMMENTS FOR PROPOSED KAMEHAMEHA HIGHWAY, KAIPAPAU STREAM BRIDGE REPLACEMENT, FEDERAL-AID PROJECT NO. BR-083-1(48)

Thank you for your comment letter of December 4, 2006, on the subject project. The State of Hawaii Department of Transportation (HDOT) offers the following response to your comments on the Draft Environmental Assessment (EA):

1. We acknowledge receipt of a copy of a letter dated March 7, 2006, from your agency responding to our request for comments in accordance with Section 106 and the National Historic Preservation Act.

2. We will be transmitting the Archaeological Site Assessment and Cultural Impact Assessment to your office under separate cover.

3. The proposed action requires the replacement of an existing bridge structure in the same location, therefore pre-construction testing is not practical. We agree that on-site monitoring during demolition and construction is not entirely error free, however, we need to proceed in this manner to minimize the disruption to adjoining homeowners and the traveling public.

As stated previously, if we encounter any significant cultural deposits or human skeletal remains, we will stop work and the State Historic Preservation Division will be notified and consulted for guidance.

Should you have any questions, please contact Li Nah Okita of our Highways Division at 692-7581 or Duane Taniguchi at 692-7582 and reference HWY-DD 2.3444 as noted above.

Attachment

c: Federal Highway Administration (Eric Worrell)
R. M. Towill(Walter Chong)