



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

STAFF SUBMITTAL
for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

November 19, 2008
Honolulu, Oahu

Application for a Stream Diversion Works Permit (SDWP.2008.3)
Reconstruction of Stream Diversion and Intake, Punaluu Stream
Punaluu, Oahu, TMK: (1) 5-3-011:001

APPLICANT:

Kamehameha Schools (KS)
567 South King Street
Honolulu, HI 96813

LANDOWNER:

Same

SUMMARY OF REQUEST:

Application for a Stream Diversion Works Permit (SDWP) to reconstruct the existing diversion and intake to the Punaluu Ditch on Punaluu Stream, Punaluu, Oahu, TMK: (1) 5-3-011:001, (SDWP.2008.3).

LOCATION:

The existing stream diversion is located on Punaluu Stream in Punaluu, Oahu. See Exhibit 1.

BACKGROUND

The proposed project is centered around the existing diversion of the perennially flowing Punaluu Stream into the Punaluu Ditch system. The Punaluu diversion, intake and ditch were constructed in the 1920's for sugarcane irrigation and continue to divert water from Punaluu Stream for agricultural uses such as cultivation of taro and vegetable crops, ornamental plants, livestock, and aquaculture operations. Punaluu Ditch consists of open ditches connected by 12 tunnels and one flume. It extends approximately two miles from the intake at an elevation of about 210 feet above mean sea level (msl) to its terminus in Kaluanui Stream Valley at +50 msl.

KS is proposing to reconstruct the existing diversion for the following reasons:

- The existing diversion intake is located upstream of the USGS Punaluu Stream gage weir, and accurate estimates of stream flow at this location can only be determined by simultaneously measuring flow in both the ditch and the stream. Ditch flow information is used to adjust the stream gage data. The need to measure at two locations doubles the cost of maintaining accurate flow measurements on Punaluu Stream.
- The existing configuration causes the ditch system to capture all stream flow during very low flow conditions. While this design maximizes delivery of water for off-stream uses, it adversely affects the habitat used by native aquatic fauna.

- While the existing screen intake is effective in preventing large rocks and debris from entering the ditch system, it is prone to clogging with smaller floating debris such as leaves. As a result, the intake must be cleaned frequently to maintain ditch flows, and the cost of this adversely affects the economics of the irrigation system.
- The ditch system is manually controlled, and adjusting the amount of water that enters the ditch system must be done manually. This adds to the cost of operation and leads to a greater volume of water being diverted than the volume that would be diverted with automatic controls.

The modified diversion and intake will:

- Improve aquatic life by:
 1. Allowing a base flow to remain in the stream during low flow rates.
 2. Leaving all flow in the stream during the early evening hours when aquatic species are active.
 3. Providing two channels along the banks of the stream channel to allow aquatic species to bypass the diversion as they move upstream and downstream.
- Reduce maintenance needs and costs because the new intake screen will utilize the stream flow as a natural self-cleaning mechanism.
- Allow the USGS to abandon its ditch gaging station and still obtain accurate measurements of the flow in Punaluu Stream.

DESCRIPTION

KS is proposing to reconstruct the existing Punaluu Stream weir/diversion and Punaluu Ditch intake. Nearly all the work will be within the footprint of existing structures. The proposed reconstruction will involve small changes to the height of the existing diversion, which is currently between 211.9 and 213.23 feet above msl across the entire stream channel. When the reconstruction is completed, the diversion structure will have the following sections:

- 19 feet-2 inches wide, high-flow diversion structure (invert 213.87 feet).
- 15 feet-6 inches wide, low-flow intake structure with rubble concrete and intake screen (invert 213.27 feet).
- Two, 18-inch wide, side channels at each end to allow the migration of aquatic species upstream and downstream.
- A new concrete wall and reinforced concrete jacket for a 22-inch diameter pipe from intake structure to the tunnel (invert 210.0 feet the entire length).

See Exhibits 2 and 3 for drawings depicting plan and section views of the proposed reconstructed structure.

Approximately six cubic yards (CY) of the existing structure and streambed materials will be removed with pneumatic jackhammers within a dry sandbagged area to accommodate the modifications. Larger rock and stone fragments removed from the existing diversion will be stacked to provide two "fish ramps" on the downstream side of diversion structure for migrating aquatic species. All other excavated materials and construction waste will be bagged and removed from the site for proper disposal elsewhere.

The entire structure will be about 38 feet long across the stream and will require 30 CY of concrete, 400 pounds of steel reinforcing bar, 93 square feet of stainless steel inlet grating, 20 linear feet of 22-inch diameter, high-density polyethylene (HDPE) pipe, approximately 12 CY of existing rocks repositioned, and approximately 2,000 sand bags to temporarily divert the stream flow away from the active work site.

Most of the instream work areas will be sandbagged during construction; and no dewatering will be necessary. Because major components of the new weir and intake are pre-fabricated, the only work necessary within the streambed will be the excavation of portions of the existing weir, the emplacement of the new weir and intake structure, and the installation of the downstream "fish ramps".

The weir portion of the structure will likely be pre-cast in 1,000 to 2,000 lb. sections, delivered from the staging area to the site by helicopter, and then anchored and grouted in place. The new diversion will be made of inert materials and will not significantly impact the chemical environment. The total area of

streambed disturbed will be approximately 1,600 square feet; about half of that will be in the area occupied by the existing weir/diversion.

The ditch system will remain operational throughout the construction period in order to continue serving downstream water users. The reconstruction work will be scheduled during anticipated low flow periods of the stream and will be done in increments by sandbagging portions of the structure to provide a dry work area and to keep the construction activity from adversely affecting water quality.

Approximately 800 feet of pipe (only about 20 feet will be placed in the streambed with the remainder being placed in the irrigation ditch) will be brought to the staging area at the outlet of Tunnel 1 in 20 to 25-foot lengths by truck, fused into a single length and pushed into place. The addition of a control valve and solar powered controls will complete the work at this location. No grading or ground disturbance will be needed to accomplish this work.

Because of the relatively small quantities of materials involved in the weir reconstruction, the actual time that work will be done in the stream is expected to be less than a month. The construction work will be broken into independent stages, each of which could be completed in approximately one week, which is the maximum amount of time for which accurate rainfall forecasting is typically possible. Ideally, the work will be undertaken over four consecutive weeks, but the desire to limit the work to periods of modest streamflow may require the work to be spread over several months. Construction is scheduled to begin in June 2009 and be completed by October 2009.

ANALYSIS:

On July 16, 2007, John Ford, Program Director and Senior Biologist with SWCA Environmental Consultants, stated that:

- The design features incorporated into the modification of the existing intake and weir were supported by 35 years of field research and observation of many Hawaii stream biologists.
- The proposed modifications were specifically designed to help restore the natural function of the stream despite the presence of the dam diversion and will facilitate upstream and downstream migration for different life segments of the native goby fish, mountain shrimp, and mollusks.
- Upstream migration of post-larvae returning to the stream from their early development in the ocean will be enhanced by the continuous passage of low flows across the two narrow channels at the edge of the new structure.
- The proposed stainless steel intake with narrowly spaced bars will prevent entrainment of adult fish and shrimp into the intake ditch.
- Downstream drift of recently hatched larvae will be improved by the automated closure of the intake for three hours following sundown each day. Closure of the intake will help avoid larval entrapment into the diversion ditch and facilitate their passage downstream to the sea at the time of day when maximum larval drift is known to occur.

The City and County of Honolulu, Department of Planning and Permitting made the following comments regarding the stream diversion:

- The diversion works is not located in the Special Management Area (SMA) and, therefore, is not subject to SMA use permit requirements.
- According to the Flood Insurance Rate Map (FIRM), the diversion works is not located within the AE floodway district; and, therefore, a certification of "no-rise" is not applicable.
- The diversion works does not involve any grading and, therefore, is not subject to the City and County's grading ordinance.
- The applicant should consult with the Board of Water Supply regarding the status of Punaluu Stream as a priority stream in the City's Oahu Water Management Plan and the Koolau Loa Watershed Management Plan.

The Department of Health Clean Water Branch commented that the proposed project is subject to Section 401 Water Quality Certification (WQC) requirements. The Office of Hawaiian Affairs (OHA) asked:

- If the reduced operating costs will be passed on to the users of the system.
- If the percentage of water diverted for agriculture can be determined after the project is completed.
- About best management practices or other mitigative techniques to reduce the impacts of the project.

The Division of Aquatic Resources (DAR) encouraged and supported the proposed modifications to the existing diversion because the two 18" side channels with roughened surfaces on both sides of the diversion will help accommodate the upstream migration of post-larval gobies around the diversion even during low flows. DAR commented that the control valve assembly to shut off water taken from the diversion at dusk will help allow the passage of larval drift from above the diversion to the ocean and recommended that the shut-off period for the control valve be extended from two hours to three hours at night since the water would not be used by farmers for irrigation during the night.

The Land Division commented that Kamehameha Schools/Bishop Estate owned the land where the stream diversion reconstruction is located; and consequently, no permits are required from the Land Division.

The Engineering Division commented that the project site is located in Flood Zone D according to the Flood Insurance Rate Map (FIRM), and the Flood Insurance Program does not have any regulations for developments within Flood Zone D.

State Parks, and Forestry and Wildlife had no objections to the project. The U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Department of Hawaiian Home Lands, Historic Preservation, and University of Hawaii Environment Center did not submit comments as of the date of preparation of this submittal.

RECOMMENDATION:

That the Commission approve a Stream Diversion Works Permit (SDWP) to reconstruct the existing diversion and intake to the Punaluu Ditch on Punaluu Stream, Punaluu, Oahu, TMK: (1) 5-3-011:001.

Respectfully submitted,



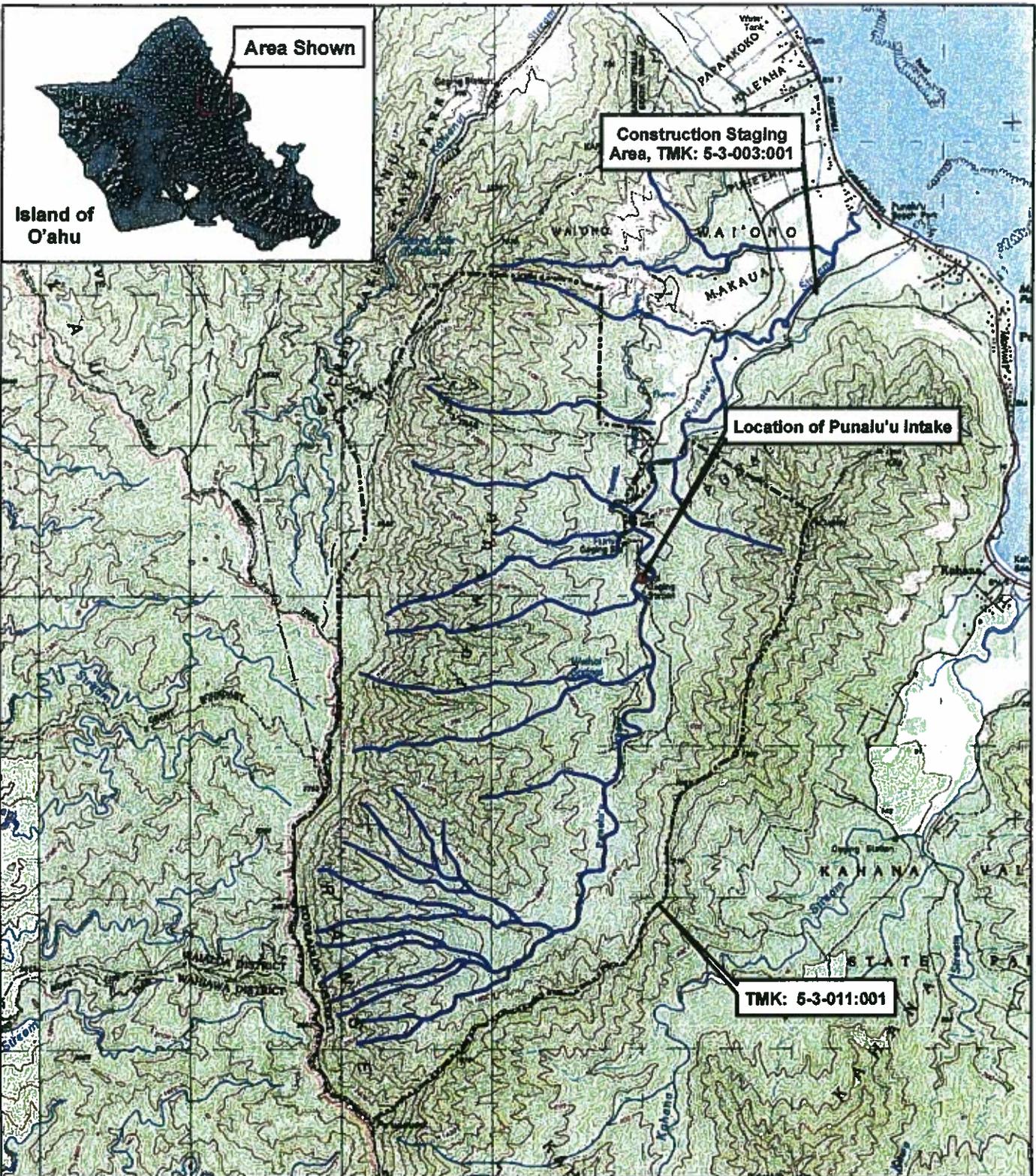
KEN C. KAWAHARA, P.E.
Deputy Director

- Exhibits:
1. Location Map
 2. Site Plan
 3. Section Views
 4. Photos of the Project Site
 5. Standard Stream Diversion Works Permit Conditions

APPROVED FOR SUBMITTAL:



LAURA H. THIELEN
Chairperson



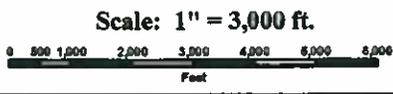
Prepared For:
Kamehameha Schools

Prepared By:

PLANNING SOLUTIONS

Sources:
 -State of Hawaii GIS
 -City & County of Honolulu GIS
 -USGS 7.5' Quad Maps
 -Google Earth

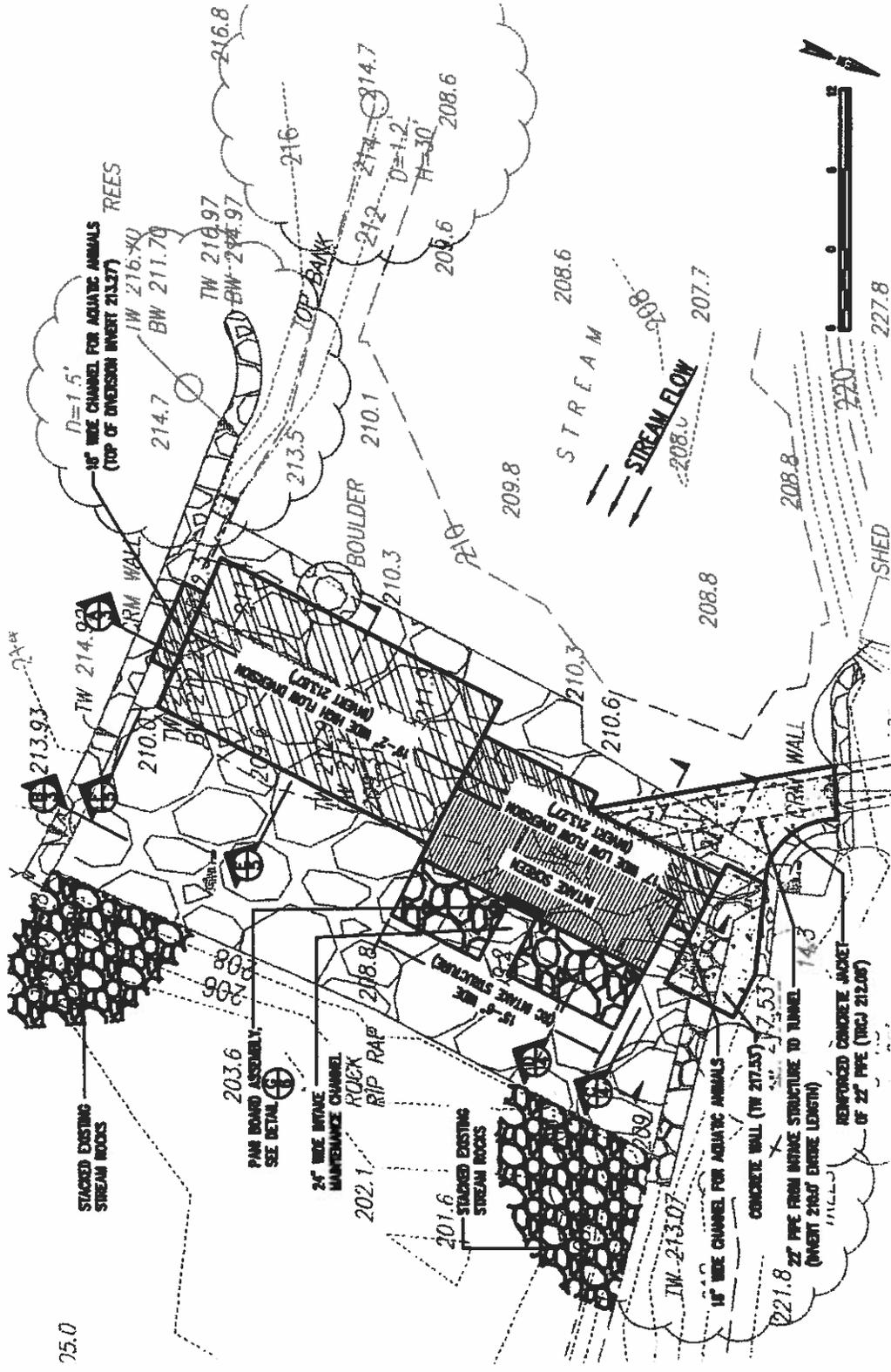
Legend:



Location Map

Punalu'u Stream Diversion
Reconstruction Project

2008 F. Loewen Map, 2008-07-18.amd



Site Plan

Punalu'u Stream Diversion
Reconstruction Project

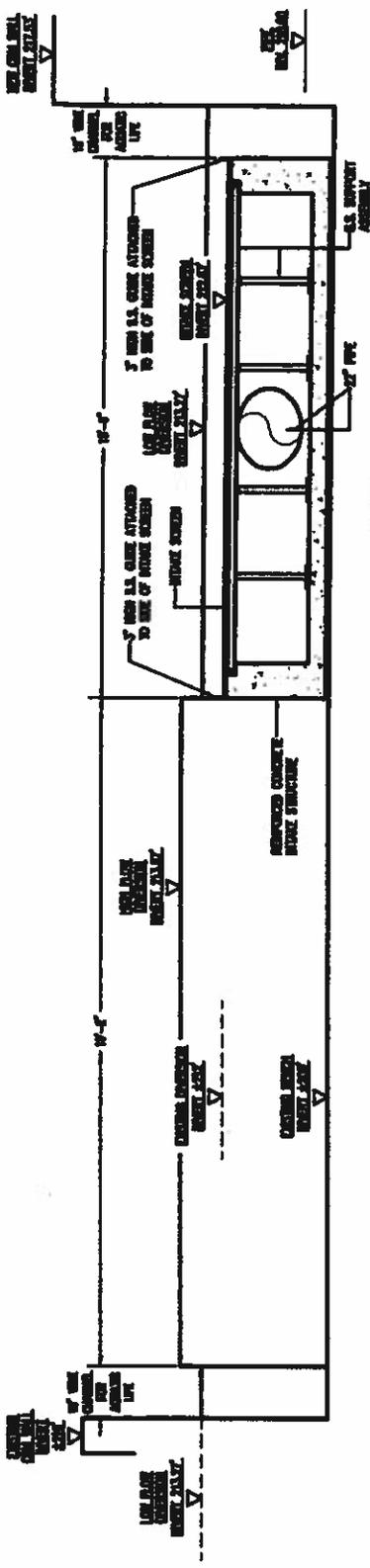
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Kamehameha Schools

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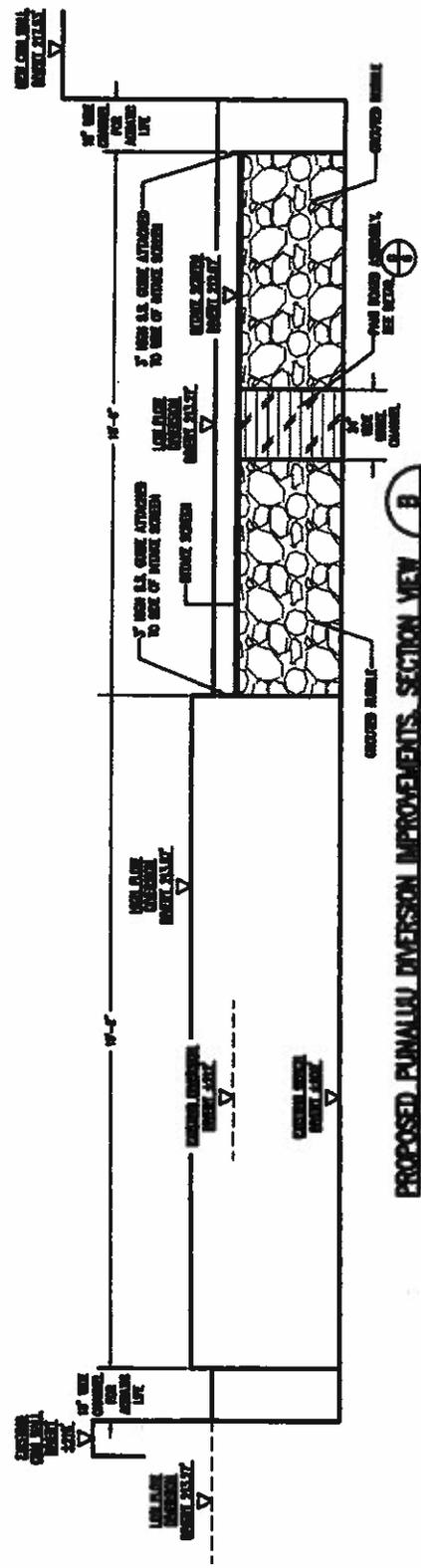
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ITC Water Management, Inc.

Legend:



SECTION VIEW A

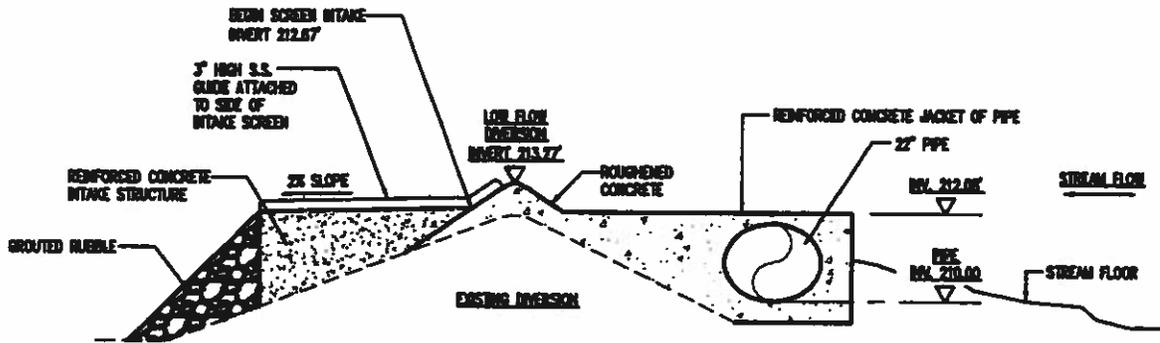
PROPOSED PUNALUU DIVERSION IMPROVEMENTS SECTION VIEW A



SECTION VIEW B

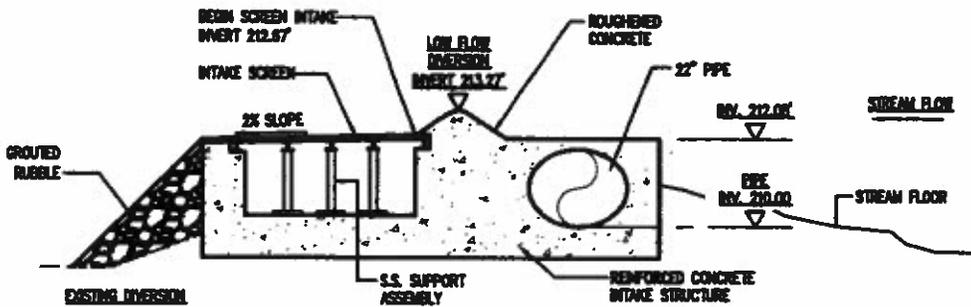
PROPOSED PUNALUU DIVERSION IMPROVEMENTS SECTION VIEW B

<p>Prepared For: Kamehameha Schools</p> <p>Prepared By:  PLANNING SOLUTIONS</p> <p>Source: ITC Water Management, Inc.</p>	<h2 style="text-align: center;">Section Views A & B</h2> <p style="text-align: center;">Punalu'u Stream Diversion Reconstruction Project</p>
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PROPOSED PUNALUU DIVERSION IMPROVEMENTS, SECTION VIEW C
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PROPOSED PUNALUU DIVERSION IMPROVEMENTS, SECTION VIEW D
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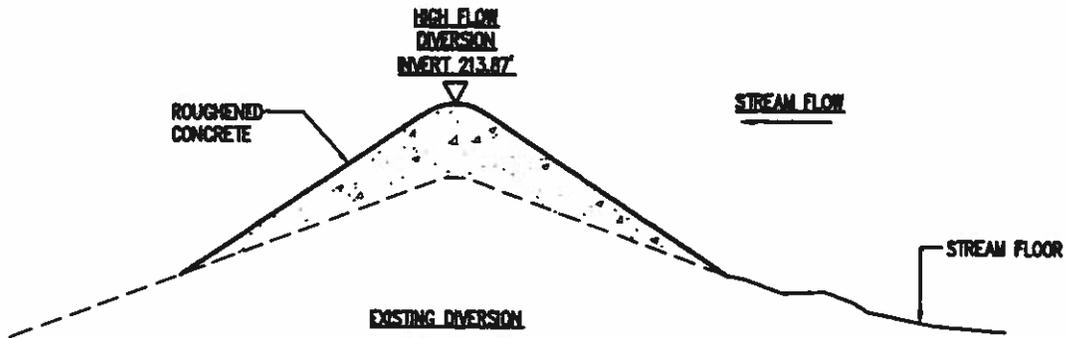
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Sources:

ITC Water Management, Inc.

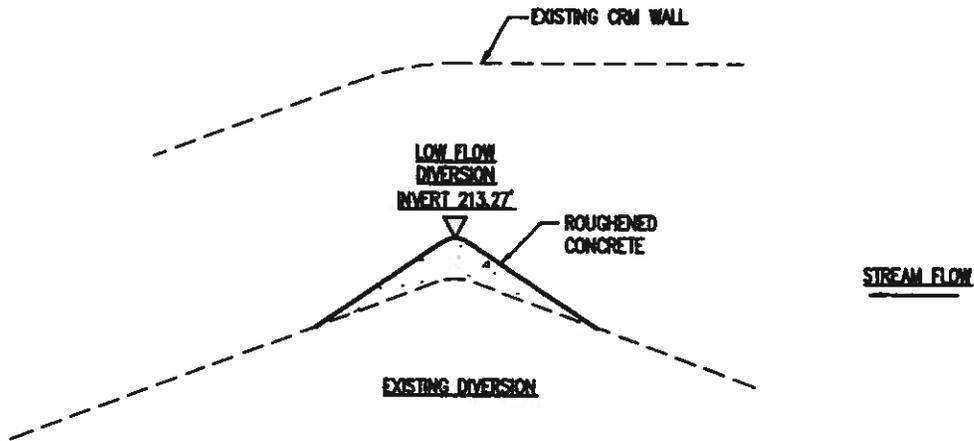
Section Views C & D

Punaluu Stream Diversion
Reconstruction Project



PROPOSED PUNALUU DIVERSION IMPROVEMENTS, SECTION VIEW
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PROPOSED PUNALUU DIVERSION IMPROVEMENTS, SECTION VIEW
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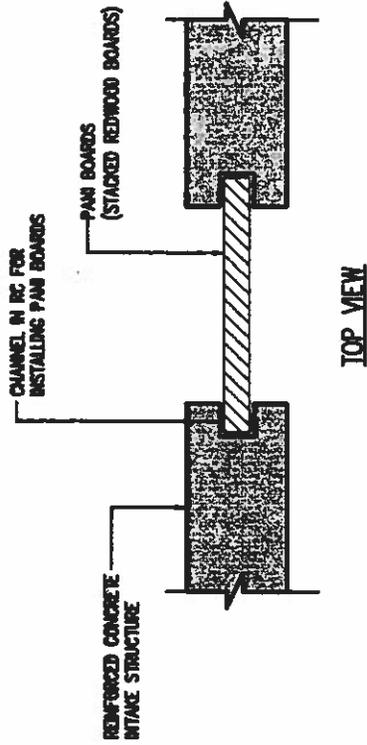
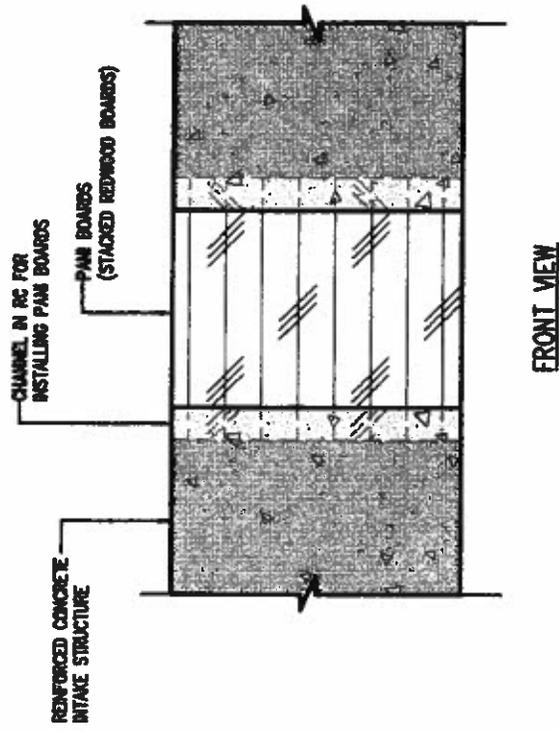
Sources:

ITC Water Management, Inc.

Section Views
E & F

Punalu'u Stream Diversion
Reconstruction Project

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PROPOSED PUNALUU DIVERSION IMPROVEMENTS
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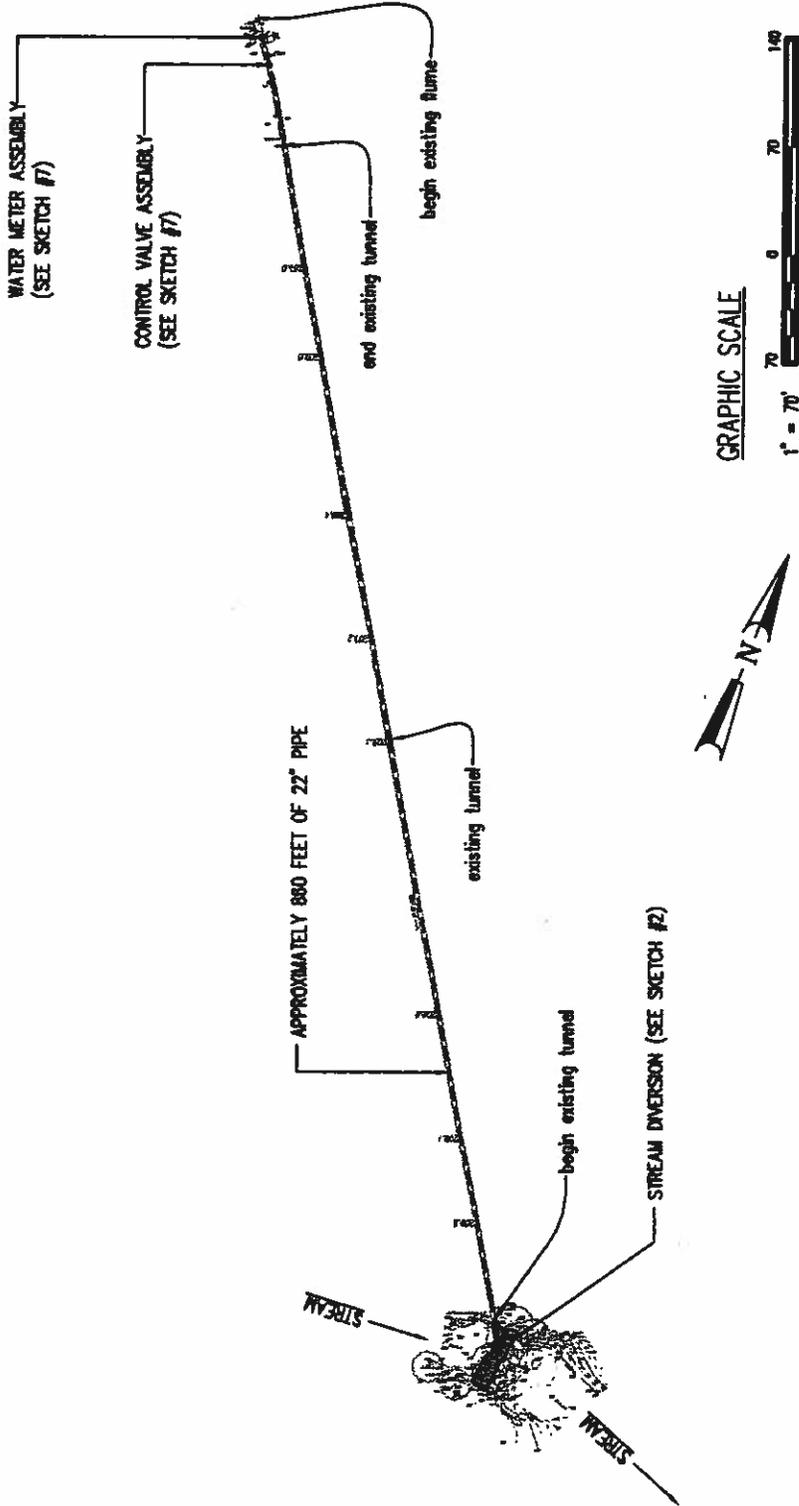
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Source:

ITC Water Management, Inc.

Section Views G

Punaluu Stream Diversion
Reconstruction Project



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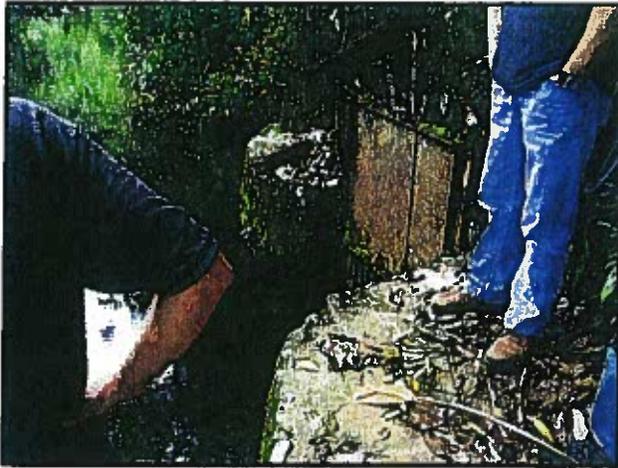
Prepared By:

 FLAMMING
 SOLUTIONS

Sources:
 ITC Water Management, Inc.

Pipeline, Valve & Meter Plan

Punalu'u Stream Diversion
 Reconstruction Project



A. Punalu'u Ditch intake.



B. USGS Punalu'u Stream gaging station and ditch intake.



C. Existing Punalu'u Stream diversion.



D. Punalu'u Ditch intake clogged with debris.

Prepared For:

Kamehameha Schools

Prepared By:



Sources:

Photos B & D by USGS (2006)
Photos A & C by PSI

Figure:

**Photographs of
Project Site**

Punalu'u Stream Diversion
Reconstruction Project

Photographs of Project Site 2006-09-03.jpg

STANDARD STREAM DIVERSION WORKS PERMIT CONDITIONS

(Revised 9/19/07)

1. The permit application and staff submittal approved by the Commission at its meeting on November 19, 2008, shall be incorporated herein by reference.
2. The applicant shall comply with all other applicable statutes, ordinances, and regulations of the Federal, State and county governments.
3. The applicant, his successors, assigns, officers, employees, contractors, agents, and representatives, shall indemnify, defend, and hold the State of Hawaii harmless from and against any claim or demand for loss, liability, or damage including claims for property damage, personal injury, or death arising out of any act or omission of the applicant or his successors, assigns, officers, employees, contractors, and agents under this permit or related to the granting of this permit.
4. The applicant shall notify the Commission, by letter, of the actual dates of project initiation and completion. The applicant 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 applicant 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 applicant shall develop site-specific, construction best management practices (BMPs) that are designed, implemented, operated, and maintained by the applicant 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 applicant shall protect and preserve the natural character of the stream bank and stream bed to the greatest extent possible. The applicant 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 applicant 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.